Nevada
Environmental
Restoration
Project

DOE/NV--1284

National Nuclear Security Administration

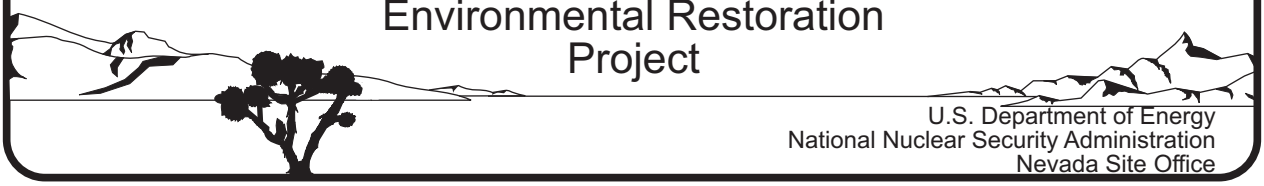
Post-Closure Inspection and Monitoring Report for Corrective Action Unit 110: Area 3 WMD U-3ax/bl Crater, Nevada Test Site, Nevada

For the Period July 2007–June 2008

Controlled Copy No.:_____

Revision: 0

August 2008



Environmental Restoration
Project

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

DISCLAIMER

DOE/NV--1284

POST-CLOSURE INSPECTION AND MONITORING REPORT FOR CORRECTIVE ACTION UNIT 110: AREA 3 WMD U-3ax/bl CRATER, NEVADA TEST SITE, NEVADA

FOR THE PERIOD JULY 2007–JUNE 2008

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

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FOR THE PERIOD JULY 2007–JUNE 2008

Approved By: /s/ Kevin Cabble Date: 8/11/08
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ACRONYMS AND ABBREVIATIONS

BJY	Buster Jangle Y
CAU	Corrective Action Unit
cm	centimeter(s)
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
FFACO	*Federal Facility Agreement and Consent Order*
ft	foot (feet)
in.	inch(es)
m	meter(s)
LLNL	Lawrence Livermore National Laboratory
NDEP	Nevada Division of Environmental Protection
NNSA/NV	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
PCIMR	Post-Closure Inspection and Monitoring Report
RCRA	*Resource Conservation and Recovery Act*
RWMS	Radioactive Waste Management Site
SM	subsidence monument
TDR	Time Domain Reflectometry
UR	use restriction
VMC	volumetric moisture content
WMD	Waste Management Division

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EXECUTIVE SUMMARY

This Post-Closure Inspection and Monitoring Report (PCIMR) provides the results of inspections and monitoring for Corrective Action Unit (CAU) 110, Area 3 WMD [Waste Management Division] U-3ax/bl Crater. This PCIMR includes an analysis and summary of the site inspections, repairs and maintenance, meteorological information, and soil moisture monitoring data obtained at CAU 110 for the period July 2007 through June 2008.

Site inspections of the cover were performed quarterly to identify any significant changes to the site requiring action. The overall condition of the cover, perimeter fence, and use restriction (UR) warning signs was good. However, settling was observed that exceeded the action level as specified in Section VII.B.7 of the Hazardous Waste Permit Number NEV HW021 (Nevada Division of Environmental Protection, 2005). This permit states that cracks or settling greater than 15 centimeters (6 inches) deep that extend 1.0 meter (m) (3 feet [ft]) or more on the cover will be evaluated and repaired within 60 days of detection.

Two areas of settling and cracks were observed on the south and east edges of the cover during the September 2007 inspection that exceeded the action level and required repair. The areas were repaired in October 2007. Additional settling and cracks were observed along the east side of the cover during the December 2007 inspection that exceeded the action level, and the area was repaired in January 2008. Significant animal burrows were also observed during the March 2008 inspection, and small mammal trapping and relocation was performed in April 2008.

The semiannual subsidence surveys were performed in September 2007 and March 2008. No significant subsidence was observed in the survey data. Monument 5 shows the greatest amount of subsidence (-0.02 m [-0.08 ft] compared to the baseline survey of 2000). This amount is negligible and near the resolution of the survey instruments; it does not indicate that subsidence is occurring overall on the cover.

Soil moisture results obtained to date indicate that the CAU 110 cover is performing well. Time Domain Reflectometry (TDR) data show regular changes in the shallow subsurface with significant rain events; however, major changes in volumetric moisture content (VMC) appear to be limited to 1.8 m (6 ft) below ground surface or shallower, depending on the location on the cover. At 2.4 m (8 ft) below the cover surface, TDR data show soil moisture content remained between 9 and 15 percent VMC, depending on the TDR location. The west portion of the cover tends to reflect a lower moisture content and less variability in annual fluctuations in moisture content at this depth.

Results of soil moisture monitoring of the cover indicate that VMC at the compliance level (at 2.4 m [8 ft] below the cover surface) is approaching a steady state. If the moisture content at this level remains consistent with recent years, then a recommendation may be made for establishing compliance levels for future monitoring.

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1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVES

Corrective Action Unit (CAU) 110, Area 3 WMD [Waste Management Division] U-3ax/bl Crater, is located in Area 3 of the Nevada Test Site (NTS) in Nye County, Nevada. This Post-Closure Inspection and Monitoring Report (PCIMR) provides an analysis and summary of site inspections, repair and maintenance activities, subsidence surveys, vegetation monitoring, meteorological information, and soil moisture monitoring data obtained at CAU 110 for the period July 2007 through June 2008. This PCIMR has been prepared in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) of 1996, as amended February 2008.

Inspections of CAU 110 are conducted quarterly to determine and document the physical condition of the Area 3 WMD U-3ax/bl Crater cover and any unusual conditions that could impact the proper operation of the waste unit cover.

The objective of the soil moisture monitoring program is to monitor the stability of soil moisture conditions within the upper 2.4 meters (m) (8 feet [ft]) of the cover and detect changes that may indicate moisture movement exceeding the designed performance expectations of the cover.

1.2 BACKGROUND

The Area 3 WMD U-3ax/bl Crater is an historic radioactive disposal unit located within the Area 3 Radioactive Waste Management Site (RWMS) on the NTS (Figure 1). The unit, which was formed by excavating the area between two subsidence craters (U-3ax and U-3bl), was operationally closed in 1987 under the *Resource Conservation and Recovery Act* (RCRA) as a hazardous waste landfill.

The Area 3 WMD U-3ax/bl Crater was identified as an historic RCRA site and was closed in accordance with the RCRA Part B Permit issued by the Nevada Division of Environmental Protection (NDEP), Permit Number NEV HW009 (NDEP, 2000). This permit specified that the unit would be closed under Title 40 Code of Federal Regulations (CFR) Part 265 (CFR, 1996) closure requirements for interim status facilities. Additional closure requirements included U.S. Department of Energy (DOE) Order 5820.2A (DOE, 1988) and DOE Order 435.1 (DOE, 1999).

1.3 GEOLOGIC SETTING

Area 3 is located in Yucca Flat, a topographically closed valley on the eastern side of the NTS (Lawrence Livermore National Laboratory [LLNL], 1982). Yucca Flat is an internal draining, north-south trending valley and is bounded on the north by Quartzite Ridge; on the east by Halfpint Range; on the south by Yucca Lake, Mine Mountain, CP Hills, and Massachusetts Mountain; and on the west by Rainier Mesa, Eleana Range, and Shoshone Mountain.

Surficial sediment in Area 3 consists of Quaternary and Tertiary valley-fill alluvium derived from the surrounding mountains, which are composed of Paleozoic carbonates, clastics, and Tertiary volcanics. These Quaternary/Tertiary alluvial strata occur within fault-bounded troughs above the underlying Tertiary volcanic section. The average thickness of this alluvium material

FIGURE 1
LOCATION OF CAU 110: AREA 3 WMD U-3AX/BL CRATER

is approximately 300 m (980 ft), although in some places it is as thick as 2,000 m (6,560 ft). The alluvium is made up of gravel and poorly sorted sands with intermittent silt beds (LLNL, 1982).

The Yucca Flat watershed is a structurally closed basin encompassing an area of approximately 780 square kilometers (300 square miles). The structural geomorphology of Yucca Flat is typical of the Basin and Range Physiographic Province and lies in one of the most arid regions of the country. Located in the Ash Meadow Groundwater Basin, groundwater generally flows southwest and discharges at the large springs in Ash Meadows, about 25 miles southwest of Mercury, Nevada (Winograd and Thordarson, 1975). Water balance calculations for Area 3 indicate that it is continuously in a state of moisture deficit.

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2.0 POST-CLOSURE MONITORING REQUIREMENTS

2.1 BACKGROUND

Post-closure monitoring requirements for CAU 110 are described in the Closure Report for CAU 110 (U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office [NNSA/NV], 2001).

2.2 SITE INSPECTIONS

Inspections are performed quarterly, and consist of visual observations to determine the condition of the cover and to document the status of use restriction (UR) warning signs and site fencing. Each site inspection is documented on a site inspection form, and copies of these are included in Appendix A of this report.

Post-closure inspections include the following activities:

- The perimeter of the cover fencing is walked by the inspector, and the condition of the fencing, UR warning signs, entrance gate, and lock is documented.
- The seven survey subsidence monuments (SMs) located on the cover are inspected. In addition, the elevations of all seven SMs are surveyed twice a year and compared to baseline elevations collected in 2000 to determine if the cover has subsided.
- Any changes in the condition of the cover, warning signs, or fenced area are documented. Specific changes in the condition of the cover include, but are not limited to, trash/debris within the fenced area, animal burrows/nesting activity, or erosion of the cover.
- Cracks or areas of settling less than 15 centimeters (cm) (6 inches [in.]) deep on the cover are documented and scheduled for repair on an annual basis. Larger cracks or areas of settling are immediately evaluated and repaired within 60 days.
- All repair work must preserve the original cover "as built" design. If the cover repair requires modification of the cover design, the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) will present a formal design modification request to NDEP prior to making the design modification.

2.3 SOIL MOISTURE MONITORING

The CAU 110 cover is designed to limit infiltration of precipitation into the disposal unit through evapotranspiration by vegetation on the cover. The cover performance is monitored using Time Domain Reflectometry (TDR) soil water content sensors that are buried at 0.3-m (1-ft) depth intervals up to 2.4 m (8 ft) within the waste cover to provide water content profile data. TDR probes are installed at a distance of 50.3 m (165 ft) from the southern edge of the cover. An array of eight probes (a stack) is repeated at four locations across the cover (Figures 2 and 3). The soil water content profile data are used to determine whether the cover is functioning as designed. Soil moisture content data from the TDR moisture probes are recorded daily and stored on a data logger. The data are downloaded remotely over a radio/telephone link.

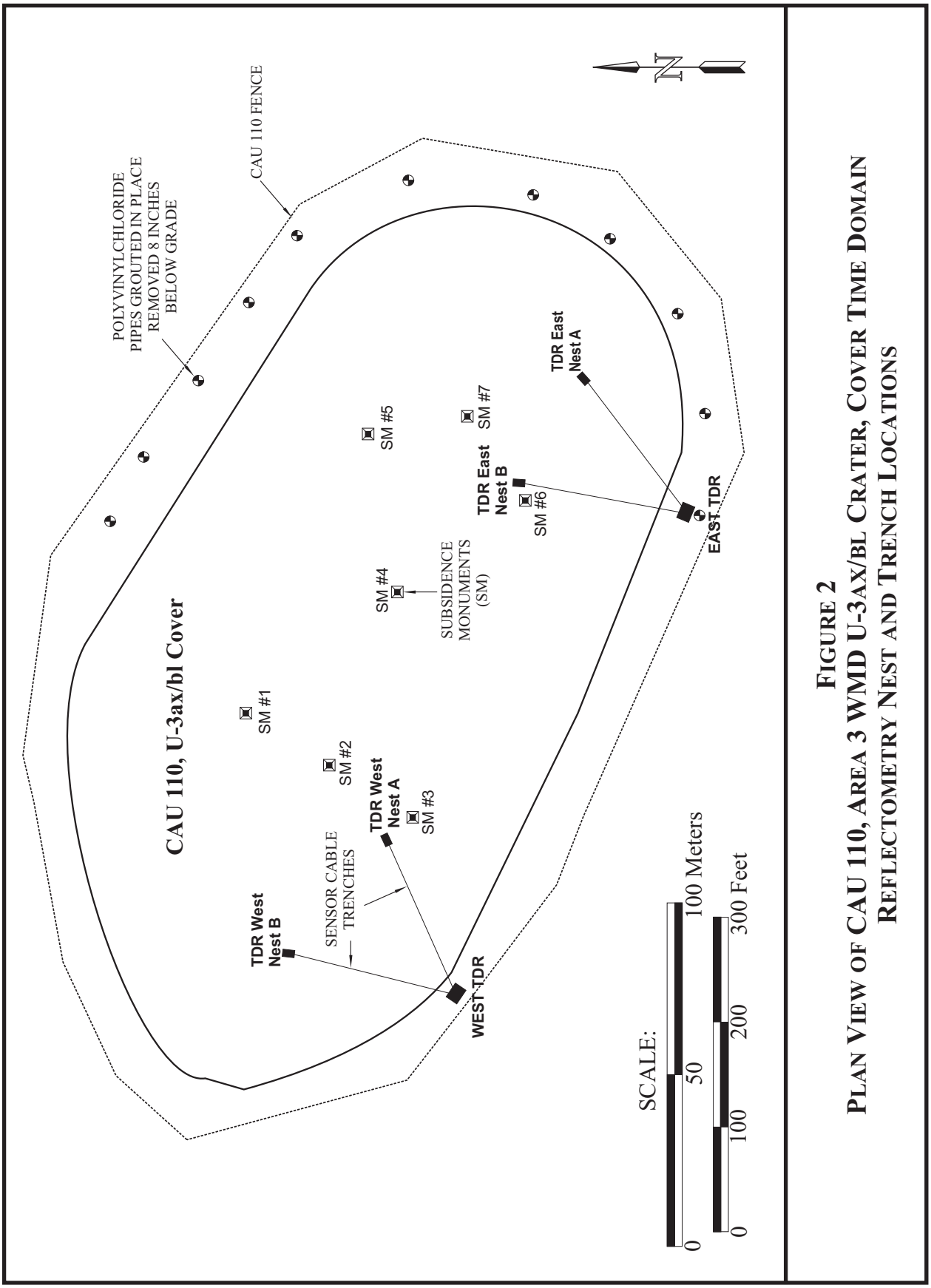

FIGURE 2
PLAN VIEW OF CAU 110, AREA 3 WMD U-3AX/BL CRATER, COVER TIME DOMAIN REFLECTOMETRY NEST AND TRENCH LOCATIONS

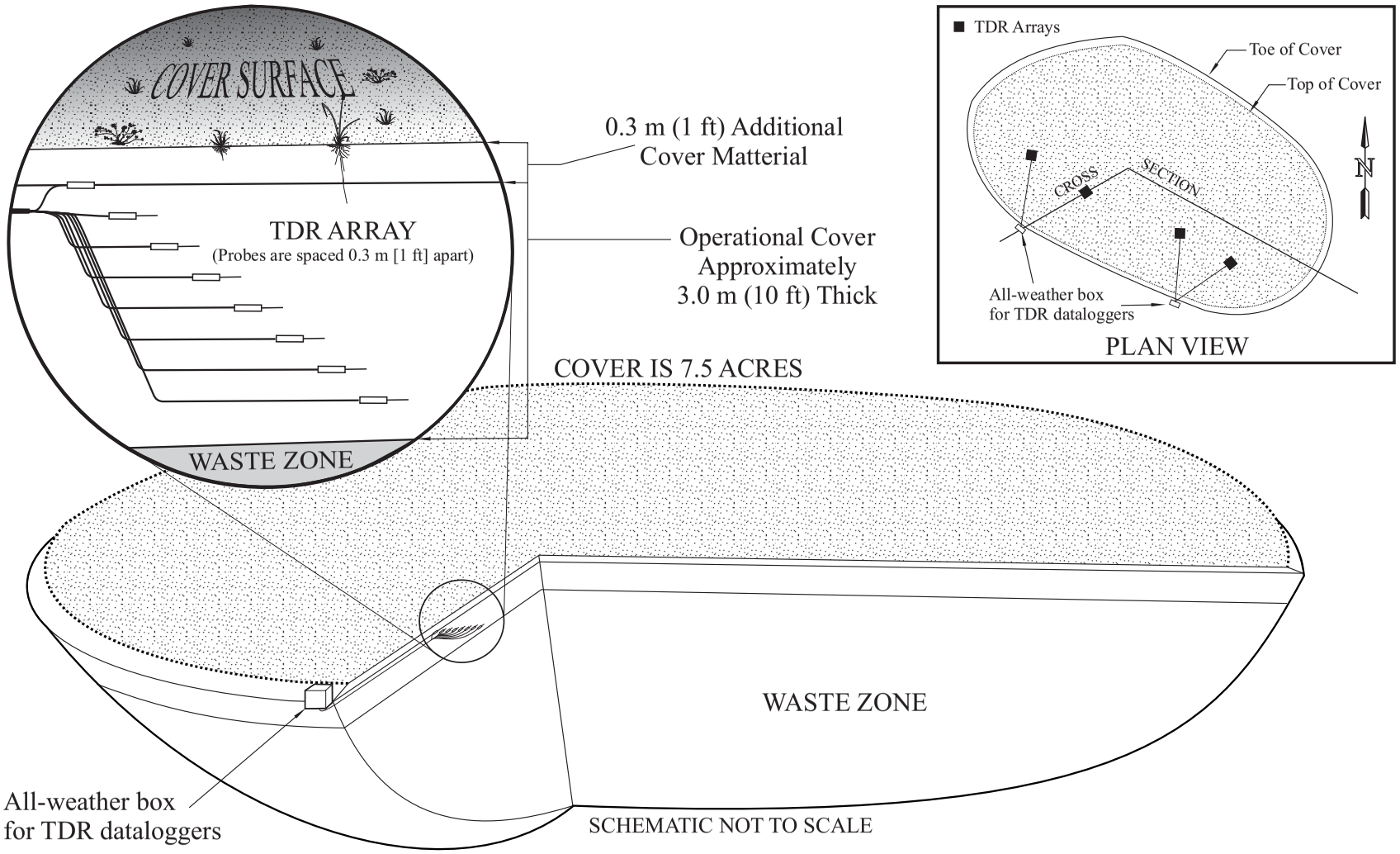

FIGURE 3
TIME DOMAIN REFLECTOMETRY INSTALLATION DIAGRAM

2.4 COMPLIANCE CRITERIA

The CAU 110 cover boundary is defined by the fence installed around the cover, which is approximately 3.0 hectares (7.5 acres) in area. The point of compliance is at the deepest TDR soil moisture probe (2.4 m [8 ft] below the cover surface). Compliance will be set based on soil moisture content; however, the specific criteria will not be established until enough data have been collected during average site conditions to establish a realistic compliance level. Once the soil moisture content within the cover reaches equilibrium under normal precipitation conditions, soil moisture compliance values will be agreed upon with NDEP. During this monitoring period, the response of the cover during normalization from above-average rainfall during the 2004 and 2005 reporting periods appears to have reached equilibrium at depths greater than 1.52 m (6 ft) below the cover surface. Shallower cover moisture is expected to continue to fluctuate with precipitation events.

The following compliance criteria have been established:

1. Notify NDEP of noncompliance within 14 days of determining that the cover is not operating according to the established compliance criteria.
2. Compile a list of non-critical maintenance activities (cracks or settling imperfections equal to or less than 15 cm [6 in.] deep on the cover), and address them in the following fiscal year.
3. Evaluate and repair cracks or settling features greater than 15 cm (6 in.) deep that extend 1 m (3 ft) or more on the cover within 60 days of detection.

2.5 REPORTING REQUIREMENTS

All inspection and maintenance activities conducted during the year will be documented and submitted to NDEP. The annual PCIMR will be provided on or before August 31 of each year. The proposed duration of post-closure inspections is five years. After five years of post-closure inspections and monitoring, NNSA/NSO may submit a request to NDEP to reevaluate the monitoring program and/or schedule.

The annual PCIMR will include the following information:

- Brief summary of each inspection
- Inspection checklists, field notes, and site photographs
- Subsidence survey results
- Monthly precipitation records for the Buster Jangle Y (BJY) meteorological station
- Periodic reports on the health of cover vegetation
- Soil moisture content profiles for the reported monitoring period
- Maintenance and repair documentation (if any)
- Specific recommendations for nonstandard maintenance or changes in post-closure monitoring

3.0 SITE INSPECTIONS, SURVEYS, AND MAINTENANCE

3.1 SITE INSPECTION RESULTS

Site inspections are conducted in March, June, September, and December. The inspections are completed to evaluate and document the performance and maintenance needs of CAU 110 in accordance with the requirements of Title 40 CFR Part 265.15, the RCRA Part B Permit (NDEP, 2005), and the CAU 110 Closure Report (NNSA/NV, 2001).

Site inspection documentation includes copies of the inspection checklists, field notes, and site photographs. Copies of the inspection checklists, associated field notes, and site photographs for September 2007, December 2007, March 2008, and June 2008 are included in Appendix A.

3.1.1 September 27, 2007, Inspection

- Minor evidence of small mammal burrowing was observed on the cover; however, the burrows were not large enough to warrant the need for corrective action.
- Settling and cracks that exceeded the compliance criterion were observed around two previously repaired areas on the south and east edges of the cover. The cracks required repair within 60 days.
- The condition of UR warning signs, fencing, TDR stations, SMs, and cover vegetation was good.

Conclusions/Recommendations:

- Perform repairs on the cracks on the south and east edges of the cover within 60 days.
- Continue inspections as scheduled.

3.1.2 December 18, 2007, Inspection

- The cracks observed during the September inspection had been repaired on October 22–24, 2007, and were in good condition with no indication of further cracking or settling.
- A new depression and cracks were observed on the east side of the cover that required repair within 60 days.
- Small mammal burrows were observed on the cover that did not require corrective action.
- The condition of UR warning signs, fencing, TDR stations, SMs, and cover vegetation was good.

Conclusions/Recommendations:

- Perform repairs on the new cracks on the east side of the cover within 60 days.
- Continue inspections as scheduled.

3.1.3 March 26, 2008, Inspection

- The depression and cracks observed on the east side of the cover during the December inspection had been repaired on January 29–30, 2008, and were in good condition with no indication of further cracking or settling.
- No other settling or cracks were observed on the cover.

- Small mammal burrowing was noted across the cover, and it was recommended to perform small mammal trapping and relocation.
- The condition of UR warning signs, fencing, TDR stations, SMs, and cover vegetation was good.

Conclusions/Recommendations:

- Perform small mammal trapping and relocation.
- Continue inspections as scheduled.

3.1.4 June 5, 2008, Inspection

- Previously repaired subsidence areas were in good condition.
- No significant cracks or subsidence were noted on the cover.
- A few burrows were noted; however, most appear to be unoccupied and recent activity was not observed (small mammal trapping was conducted in April 2008).
- The condition of UR warning signs, fencing, TDR stations, SMs, and cover vegetation was good.

Conclusions/Recommendations:

- Continue inspections as scheduled.

3.2 SUBSIDENCE SURVEY

Seven SMs were installed on the cover to provide elevation control and to determine if subsidence of the cover occurs. The SM location map is provided in Appendix C. The initial baseline subsidence survey was conducted on December 14, 2000. Subsequent surveys are conducted twice a year and are compared to the December 2000 baseline survey results. During this monitoring period, the subsidence surveys were done on September 24, 2007, and March 10, 2008.

The subsidence survey results are tabulated in Table 1. No significant subsidence is observed in the survey data. SM 5 shows the greatest decrease in elevation (-0.02 m [-0.08 ft]) compared to the baseline survey in 2000. Calculated subsidence values are negligible and near the resolution of the survey instruments, and do not indicate that subsidence is occurring on the cover.

3.3 VEGETATION SURVEY

The CAU 110 cover was initially planted with native seed on December 4–5, 2000. Surveys have been conducted every spring since the site was seeded, to assess the success of the seeding effort. The May 2008 vegetation survey report and methodology are included in Appendix D. The status of the vegetation on the CAU 110 cover was evaluated by estimating the amount of vegetative cover and density of plant species.

TABLE 1. AREA 3 WMD U-3AX/BL CRATER SUBSIDENCE MONUMENT ELEVATIONS AND SUBSIDENCE RESULTS

DATE	Elevation at Top of Monument[1] Subsidence (ft)						
	SM #1	SM #2	SM #3	SM #4	SM #5	SM #6	SM #7
December 2000 Baseline	4,021.84	4,021.28	4,019.83	4,020.99	4,021.87	4,019.25	4,020.52
	-	-	-	-	-	-	-
July 2001	4,021.83	4,021.28	4,019.83	4,020.98	4,021.86	4,019.24	4,020.51
	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01
January 2002	4,021.84	4,021.28	4,019.83	4,020.98	4,021.86	4,019.24	4,020.51
	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01
September 2002	4,021.83	4,021.27	4,019.83	4,020.98	4,021.86	4,019.24	4,020.50
	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.02
January 2003	4,021.83	4,021.27	4,019.83	4,020.98	4,021.86	4,019.24	4,020.50
	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.02
July 2003	4,021.83	4,021.27	4,019.83	4,020.97	4,021.85	4,019.24	4,020.50
	-0.01	-0.01	0.00	-0.02	-0.02	-0.01	-0.02
March 2004	4,021.82	4,021.26	4,019.82	4,020.97	4,021.83	4,019.22	4,020.49
	-0.02	-0.02	-0.01	-0.02	-0.04	-0.03	-0.03
September 2004	4,021.82	4,021.26	4,019.82	4,020.96	4,021.83	4,019.23	4,020.49
	-0.02	-0.02	-0.01	-0.03	-0.04	-0.02	-0.03
March 2005	4,021.82	4,021.26	4,019.82	4,020.96	4,021.82	4,019.22	4,020.49
	-0.02	-0.02	-0.01	-0.03	-0.05	-0.03	-0.03
September 2005	4,021.82	4,021.26	4,019.82	4,020.97	4,021.82	4,019.23	4,020.49
	-0.02	-0.02	-0.01	-0.02	-0.05	-0.02	-0.03
March 2006	4,021.82	4,021.26	4,019.82	4,020.96	4,021.82	4,019.23	4,020.49
	-0.02	-0.02	-0.01	-0.03	-0.05	-0.02	-0.03
September 2006	4,021.82	4,021.25	4,019.82	4,020.96	4,021.81	4,019.22	4,020.49
	-0.02	-0.03	-0.01	-0.03	-0.06	-0.03	-0.03
March 2007	4,021.82	4,021.25	4,019.82	4,020.96	4,021.80	4,019.22	4,020.48
	-0.02	-0.03	-0.01	-0.03	-0.07	-0.03	-0.04
September 2007	4,021.81	4,021.25	4,019.81	4,020.96	4,021.79	4,019.22	4,020.49
	-0.03	-0.03	-0.02	-0.03	-0.08	-0.03	-0.03
March 2008	4021.81	4,021.25	4,019.81	4,020.95	4,021.79	4,019.22	4,020.48
	-0.03	-0.03	-0.02	-0.04	-0.08	-0.03	-0.04

[1] Elevations based on North American Vertical Datum of 1929 in ft.

3.3.1 Vegetated Cover

Plant Cover

Total plant cover was the highest it has ever been on the landfill cover. Although the diversity of perennial plants has declined to just three perennial shrubs, perennial plant cover was higher than last year, and annual plant cover was more than four times higher this year than it was in 2004 and 2005, the last years when there was any annual plant cover on the closure cover. Total plant cover on the unseeded area between the fence and the closure cover was greater than on the cover itself; however, all plants on the unseeded area are annuals that will be reduced to dead plant material or litter over the next few weeks or months. The average percent cover estimates over the last five years are presented in Table 2.

TABLE 2. CAU 110 AVERAGE PERCENT COVER ESTIMATES

	2002	2003	2004	2005	2006	2007	2008
Total Vegetative Cover	**6.4 %**	**3.2 %**	**12.8 %**	**20.2 %**	**19.6 %**	**10.6 %**	**26.6 %**
Perennial Cover	6.4 %	2.4 %	9.6 %	16.8 %	19.6 %	10.6 %	12.6 %
Annual Cover	0.0 %	0.8 %	3.2 %	3.4 %	0.0 %	0.0 %	14.0 %
Mulch/ Litter	24.1 %	28.0 %	14.6 %	26.2 %	23.2 %	25.8 %	11.8 %
Bare	NA	30.4 %	38.4 %	5.4 %	57.2 %	63.6 %	61.4 %
Alluvium/Gravel	NA	38.4 %	34.2 %	48.2 %			

Plant Density

Overall plant density increased dramatically this year from the last two years. The increase is a direct result of the increase in the density of annual forbs and annual grasses. This year, there was a mix of native annual forbs, whereas, in previous years, prickly Russian thistle made up almost three-fourths of total annual density. Shrub density declined slightly, from 2.0 shrubs/m^2 (0.2 shrubs/ft^2) in 2007 to 1.7 shrubs/m^2 (0.2 shrubs/ft^2) this year. This may be a lingering effect of the increased grazing from small mammals that were trapped last year. Shadscale, Nevada ephedra, and winterfat are currently the only three shrub species found on the closure cover. It appears that plant density has reached equilibrium with available resources. Noxious weeds, which typically invade a newly disturbed site and use up limited supplies of water and nutrients, have decreased significantly. Non-native plants accounted for 50 to 80 percent of the total plant density in 2004 through 2006; however, they only accounted for 6 percent of the total plant density in 2008.

3.3.2 Conclusions and Recommendations

Total plant cover, at 26.6 percent, was the highest that it has been. Annual plants were more abundant, both in contributions to plant cover as well as plant density, than any other year. Typically in the past, weedy species made up the majority of annual plant cover and density. This year, however, the majority of the annual forbs were species native to the area. For the most part, the closure cover could be characterized as a native plant community for 2008.

As mentioned in last year's report, the intermediate goal of 12 percent plant cover after 5 years was maintained and exceeded. Although the current 26.6 percent coverage exceeds the intermediate goal and has reached the 25 percent coverage long-term expectations, the cover can still be expected to vary in future years and will depend on precipitation events and timing. Eventually, based on the results of cover estimates for similar plant communities on the NTS, the plant cover should stabilize near 25 percent when precipitation normalizes to historical levels.

The perennial plants found on the cover are well established and continue to provide a viable vegetative cover. Perennial plant growth, as indicated by perennial cover, was higher than last year but still less than was measured in 2005 and 2006. Similar fluctuations are expected in future years as established perennial species, essentially shrubs, continue to respond to different precipitation patterns. Perennial grasses are present on the site, but growing conditions over the past several years have not favored their growth. Perennial grasses may come back onto the U-3ax/bl closure cover when precipitation patterns and amounts are more conducive to their growth.

Vegetation monitoring in future years should focus on the effects of the increased number of small mammals during the last two reporting periods, specifically on the density and vigor of the perennial plants present on the closure cover. Without a cover of perennial native plants, these areas are prone to invasion by annual weedy species, which can spread to adjacent areas. Should these invasive species increase in density on the closure cover and appear to have a detrimental effect on the perennial plant species, as evidenced by decreases in perennial plant cover and/or density, some remedial action may be necessary to protect the composition and stability of the vegetative cover. The CAU 110 cover vegetation should continue to be monitored annually to evaluate plant cover, density, and diversity.

3.4 MAINTENANCE AND REPAIR

Site maintenance and cover repairs were performed in October 2007, January 2008, and April 2008 as a result of observations made during site inspections.

3.4.1 October 22–24, 2007, Repairs

During the September 27, 2007, inspection, two areas of settling and cracks that exceeded the settling compliance criterion were observed on the south and east edges of the cover. The areas were repaired on October 22–24, 2007. A remote vibratory compactor was used to compact the cracks in the cover. The areas were backfilled with clean, native soil using wheelbarrows and shovels, and then compacted using the compactor. Field notes for this repair are included in Appendix A.

3.4.2 January 29–30, 2008, Repairs

During the December 18, 2007, site inspection, an area of settling and cracks on the east side of the cover exceeded the settling compliance criterion. The area was repaired on January 29–30, 2008, using the same technique as the October repairs.

3.4.3 April 29–May 1, 2008, Mammal Trapping

Because of the large number of small animal burrows found on the cover and fence line during the March 26, 2008, site inspection, small mammals were trapped and relocated. Thirteen animals, all kangaroo rats, were captured and removed during a single three-night trapping

session that started April 29. Three rats were captured on the closure cover and the other 10 along the periphery of the closure cover.

4.0 SOIL MOISTURE MONITORING

The CAU 110 cover is designed to limit infiltration into the disposal unit through evapotranspiration from vegetation established on the cover for that purpose. The cover performance is monitored using TDR to provide a profile of the water content within the cover. The soil water content data will establish whether the cover is performing as designed and is in compliance with the closure plan and any compliance criteria established in the future. The point of compliance is the depth of the deepest TDR soil moisture probe (2.4 m [8 ft]).

Compliance is to be based on soil moisture content. The compliance level has not yet been established because the area was initially under drought conditions, from closure through 2003, and the drought conditions were followed by two years of exceptionally high rainfall for the area (26.49 cm [10.43 in.] and 23.32 cm [9.18 in.]). Because of these drought conditions and the subsequent high rainfall, which produced measurable infiltration events into the cover, the volumetric moisture content (VMC) within the landfill cover had not reached equilibrium, which is required to establish a compliance level. Although the VMC at shallower depths will continue to reflect precipitation events, moisture content of the landfill cover appears to be equilibrating at the compliance depth.

The soil moisture content is obtained using two Campbell Scientific TDR-100 data loggers housed in instrumentation shelters located along the periphery of the cover (Figure 2). TDR probes are Campbell Scientific CS610s using RG8 coaxial cable. The probes are installed at a distance of 50.3 m (165 ft) from the edge of the cover. The probes are buried at intervals of 0.3 m (1 ft) at depths of 0.3 to 2.4 m (1 to 8 ft) below the cover surface. Arrays of eight probes (a nest) are positioned at four locations across the cover (Figure 3). Soil moisture content data from the TDR moisture probes are collected once per day and stored on a data logger. Data are transmitted via radio frequency to a repeater station in Area 12, which has a modem connection that is used to retrieve data remotely.

Calibration of the TDR probes was documented in Appendix I of the CAU 110 Closure Report (NNSA/NV, 2001). The TDR probes were calibrated with a “dry-down” method using native soil and the full cable length. The results of the calibration indicated that a site-specific calibration equation should be used, instead of the standard Topp equation. It was also noted that due to the long cable lengths and high soil conductivities, the TDR reflection end points were extremely flat under saturated and near-saturated conditions, resulting in unreliable data in these regions. Therefore, the TDR calibration was fit only up to 30 percent VMC.

A linear regression of the calibration data over the range of 5- to 30-percent VMC yielded the following calibration equation:

$$\% \text{ VMC} = 10.3737 \times (L/L) - 17.137$$

where L/L is the trace length/probe length as recorded by the data logger.

4.1 PRECIPITATION DATA

Precipitation data were collected from the Air Resources Laboratory, Special Operations and Resources Division's CLINET Station BJY, located at 37° 03' 46" N, 116° 03' 09" W, in Area 3 of the NTS, approximately 4.8 kilometers (3 miles) northwest of CAU 110. Precipitation records obtained from this station are used to report the official rainfall for CAU 110. Precipitation records for this station for the period July 2007 through June 2008 are included in Appendix E. The precipitation data are presented in Figure 4.

The total precipitation recorded for the current monitoring period from July 2007 through June 2008 was 17.75 cm (6.99 in.). The average annual precipitation over the period 1960 through 2007 at the BJY Station is 16.26 cm (6.40 in.). Yearly rainfall has begun to normalize, with 23.32 cm (9.18 in.) recorded in the 2005 calendar year, 11.00 cm (4.33 in.) in the 2006 calendar year, and 14.30 cm (5.63 in.) in the 2007 calendar year.

4.2 SOIL MOISTURE MONITORING RESULTS

4.2.1 Results

Graphs of the TDR-derived soil moisture content, combined with the daily precipitation from the BJY meteorological station, are presented in Figures 5 through 8. Data collection began on January 25, 2001, just prior to the start of supplemental irrigation.

The soil moisture graphs, Figures 5 through 8, show several responses: the initial conditions, the irrigation wetting event and infiltration, the trend to steady-state conditions, wetted conditions from the heavy precipitation that began in late 2004, and a second trend to steady-state conditions. The initial conditions at the beginning of the data collection reflect the disturbed soil's intrinsic moisture conditions. The installation of the TDR probes is described in detail in the CAU 110 Closure Report (NNSA/NV, 2001). Health and safety considerations required that hazards caused by dust be minimized during the TDR probe installation; the trenching and compaction of each of the soil lifts required some water to be added to the soil prior to handling. The amount of water added to the soil, while kept to a minimum, was variable and resulted in a vertical moisture content profile that was not necessarily monotonic with depth as would be expected with a natural profile. Consequently, some depths appear wetter than others and are expected to remain so until the system fully equilibrates.

4.2.2 Data Trends

Summer temperatures and germination of the seeds, along with the increase in evapotranspiration, have produced long-term trends, which can be seen in the data from October 2001 to the present. An annual cycle of increasing soil moisture content at all depths can be observed peaking in August and decreasing to a minimum in January. This seasonal cyclic behavior lags behind the temperature and is most likely a combination of effects caused by the increased thermal gradient, water vapor transport from depth, and the lack of transpiration of plants during the hot summer months.

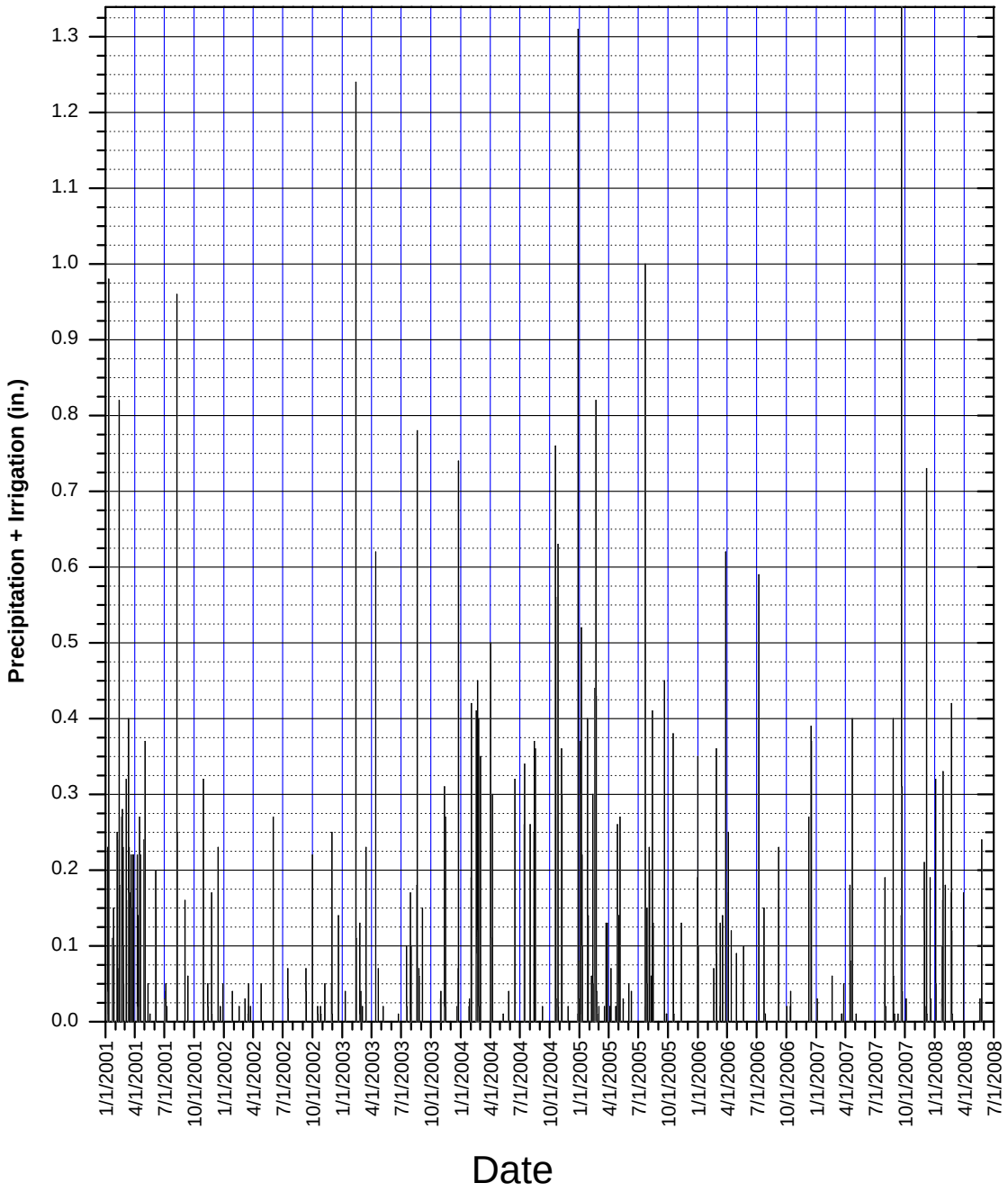

FIGURE 4
PRECIPITATION DATA FOR METEOROLOGICAL STATION BUSTER JANGLE Y

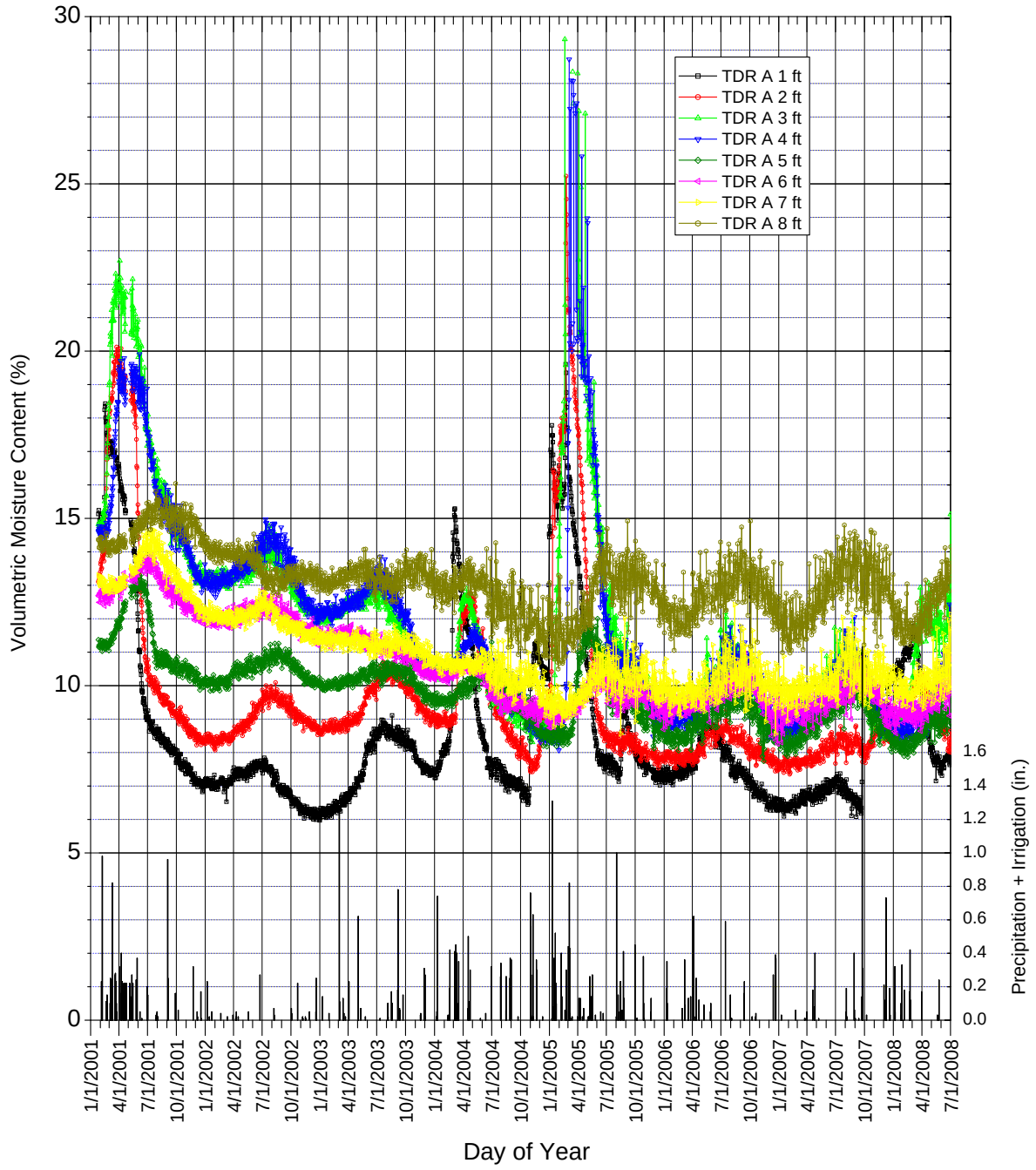

FIGURE 5
EAST TDR NEST A SOIL MOISTURE CONTENT

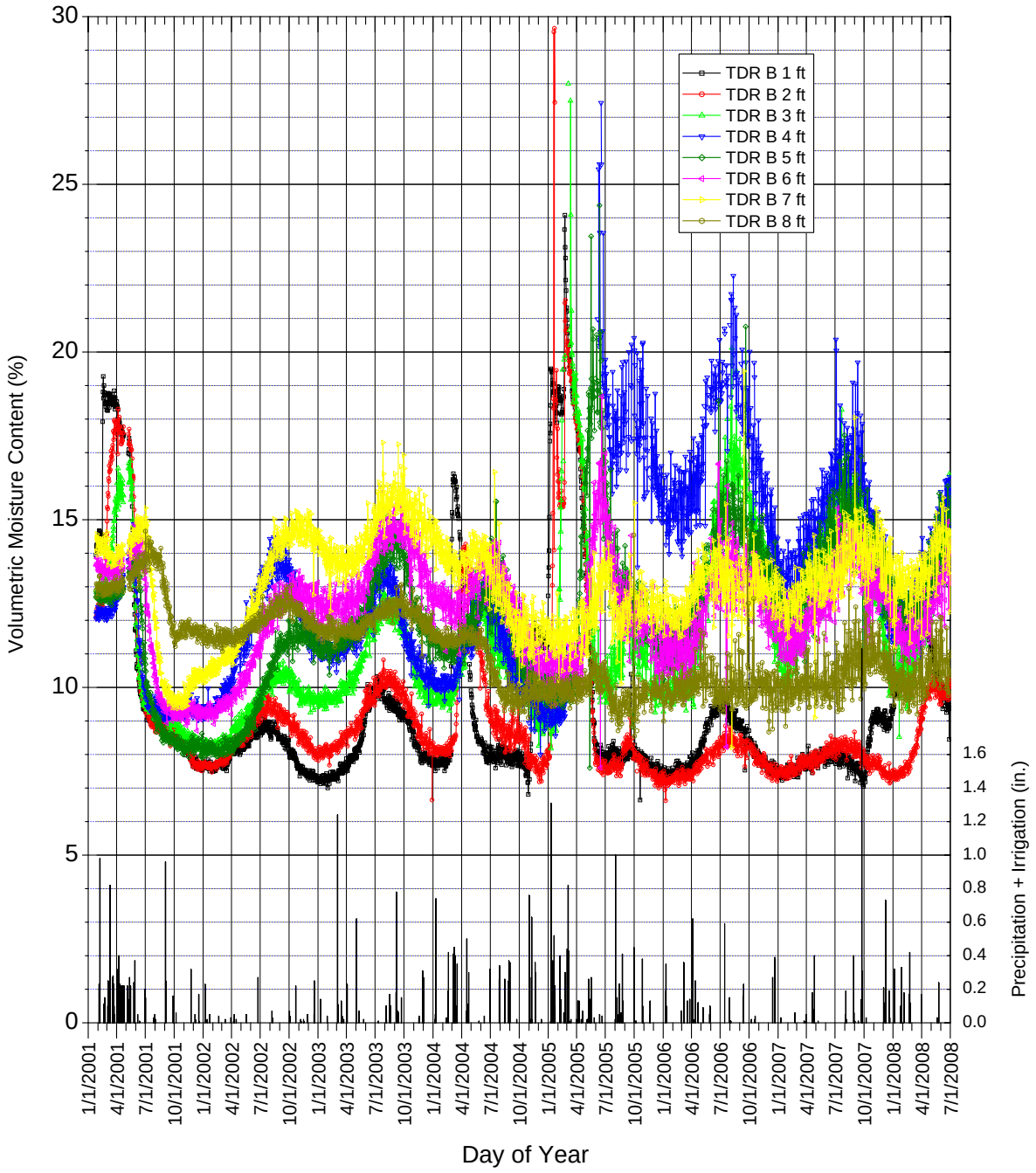

FIGURE 6
EAST TDR NEST B SOIL MOISTURE CONTENT

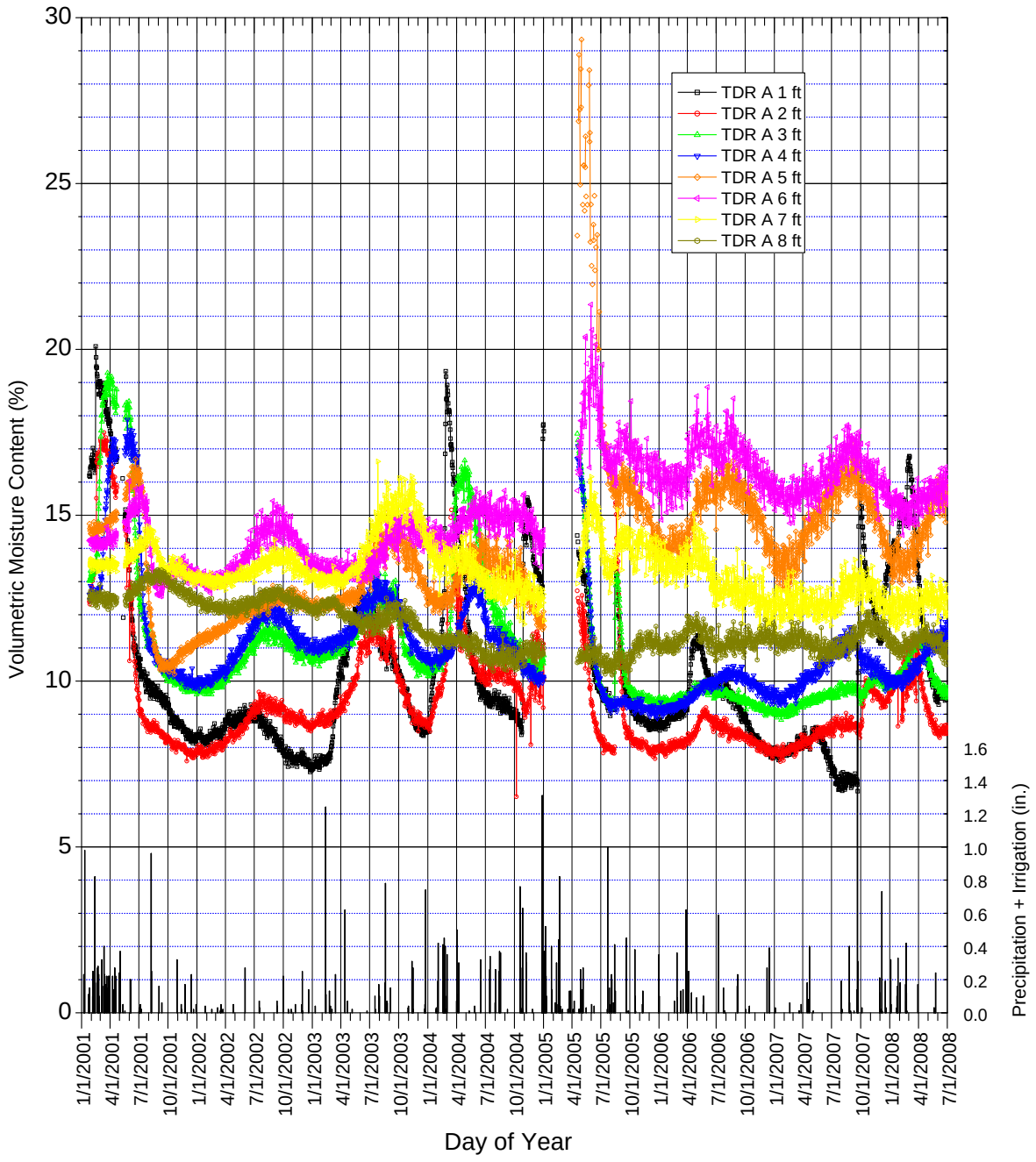

FIGURE 7
WEST TDR NEST A SOIL MOISTURE CONTENT

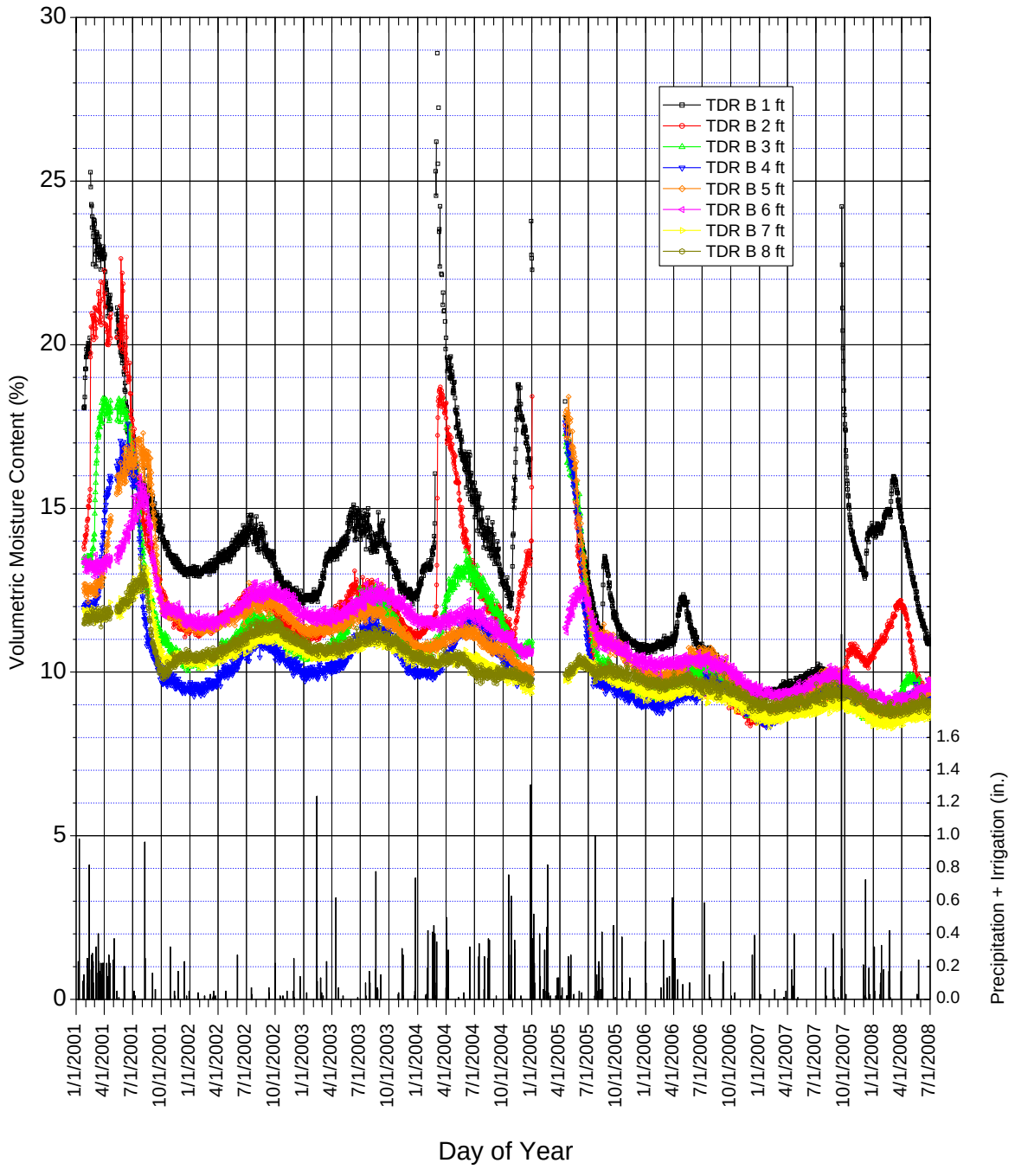

FIGURE 8
WEST TDR NEST B SOIL MOISTURE CONTENT

The TDR data indicate that soil moisture content in the CAU 110 cover had been approaching steady-state under the prior drought conditions. The heavy precipitation in January and February 2005 (10.9 cm [4.3 in.]) created saturated surface conditions, with some infiltration noted to approximately 1.8 m (6 ft) in both the east and west TDR nests. Precipitation throughout the remainder of 2005 and into 2006 and 2007 was more typical of the area, and the moisture content in both the east and west TDR nests indicate that the system has returned to, or is approaching, equilibrium conditions.

Elevated VMC that were observed subsequent to the 2005 saturation event produced a sustained shift in VMC at depths of 1.8 m (6 ft) and shallower. The moisture contents had generally returned to baseline conditions by October 2005. The VMC was still elevated at depths of 1.2 m (4 ft) to 1.8 m (6 ft), but has since dropped to levels that are most likely baseline for local non-drought years. It appears unlikely that the extended shift in moisture content represents a problem with the TDR probes at these depths. The variability in moisture content at shallow cover depths is indicative of the cover acting as designed, to capture moisture at shallow depths and, over time, return it back to the atmosphere through root uptake and evapotranspiration.

Soil moisture content values for the TDR nests at depth, particularly at the compliance depth of 2.4 m (8 ft), remained generally between 9 and 15 percent VMC. The West Nest B, at the compliance depth, has remained the most constant and lowest moisture content of all the stations, and has consistently been less than 11 percent over the past couple of years. Soil moisture content at the compliance depth of the West Nest A has also shown little variability, with a range between 9.5 and 11.5 percent over the past couple of years. East Nests A and B, at the compliance depth, show greater annual variability in moisture content; however, they also have normalized and have typically been between 11 and 15 percent (Nest A) and 9 and 13 percent (Nest B) over the past couple of years. The daily fluctuations in the East Nests are a result of the long distance between the TDR and recorder, which introduces noise into the signals, and is not indicative of daily moisture fluctuations.

5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY

- Inspections of the CAU 110 cover were performed to identify any significant changes to the unit requiring action. Cracking and settling requiring corrective actions were observed in September 2007, repaired in October 2007, observed again in December 2007, and repaired in January 2008.
- All posted UR warning signs and site fencing were in good repair.
- Subsidence surveys in September 2007 and March 2008 indicated a maximum decrease in elevation at SM 5 of -0.02 m (-0.08 ft), which is near the limit of resolution of the survey instruments. No substantial overall cover subsidence was observed.
- The plant community on the cover is well established. Plant cover is at 26.6 percent, the highest that it has been. Plant density is also elevated, due primarily to annual plant species that were absent last year.
- Shallow soil moisture content is generally variable and is dependent on precipitation events and the ability of shallow root systems and evapotranspiration to remove the moisture from the soil. The ability for these systems to remove the moisture can be locally inhibited if animal burrowing and grazing on plants affects the root systems; therefore, small mammals are being controlled to limit this damage.
- Soil moisture contents for the TDR nests at depth are generally between 9 and 15 percent VMC, depending on the location of the nest. Some locations show greater annual variability in moisture content; however, each location appears to have equilibrated to a consistent state for that location.

5.2 CONCLUSIONS

- Significant subsidence to the cover has not occurred.
- Plant cover increased from 10.6 percent in 2007 to 26.6 percent in 2008, which exceeds the plant cover intermediate density goal of 12 percent. Future monitoring should focus on the effects of the increased populations of small mammals and lagomorphs.
- Soil moisture results obtained to date indicate that the CAU 110 cover is functioning as designed.

5.3 RECOMMENDATIONS

- Continue to monitor the vegetated cover annually to evaluate plant cover, density, and diversity.
- Continue to monitor the cover during scheduled inspections for further evidence of settling and the need for repair.
- Continue to monitor the soil moisture content over the next year. Recommend a compliance level (or levels, depending on TDR location) if moisture conditions at the compliance depth of 2.4 m (8 ft) continue to show that each location remains within the same moisture content range observed over the past couple of years.

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6.0 REFERENCES

CFR, see U.S. Code of Federal Regulations.

DOE, see U.S. Department of Energy.

FFACO, see *Federal Facility Agreement and Consent Order*.

Federal Facility Agreement and Consent Order. 1996 (as amended February 2008). Agreed to by the State of Nevada, the U.S. Department of Energy, and the U.S. Department of Defense.

LLNL, see Lawrence Livermore National Laboratory.

Lawrence Livermore National Laboratory. 1982. "The Geology of Yucca Flat." In *Energy and Technology Review*, April. Livermore, CA.

NDEP, see Nevada Division of Environmental Protection.

NNSA/NV, see U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office.

Nevada Division of Environmental Protection. 2000. *Permit for a Hazardous Waste Facility, Permit Number NEV HW009*; Section VII.B.7, Carson City, NV.

Nevada Division of Environmental Protection. 2005. *Permit for a Hazardous Waste Facility, Permit Number NEV HW021*; Section VII.B.7, Carson City, NV.

U.S. Code of Federal Regulations. 1996. Title 40 Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities." Washington, D.C.

U.S. Department of Energy. 1988. DOE Order 5820A, "Radioactive Waste Management." Washington, D.C.

U.S. Department of Energy. 1999. DOE Order 435.1, "Radioactive Waste Management." Washington, D.C.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. *Closure Report for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Crater Disposal Unit, Nevada Test Site, Nevada*, DOE/NV--733, Revision 1. August 2001. Las Vegas, NV.

Winograd, I.J. and W. Thordarson. 1975. Hydrologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, with Special Reference to the Nevada Test Site. U.S. Geological Professional Paper 712-C. Washington, D.C.

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APPENDIX A

INSPECTION CHECKLISTS, FIELD NOTES, AND PHOTOGRAPHS

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Inspection Requirements: **Quarterly**

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

Inspection Date and Time: 9/27/07 10:38AM	Reason for Inspection: Quarterly
Date of Last Post-Closure Inspection: 6/4/07	Reason for Last Post-Closure Inspection: Quarterly & Annual CEI
Responsible Entity: NSTec Environmental Restoration, Nevada Test Site, Mercury, Nevada	
Responsible Facility Owner: Jeffrey L. Smith, Deputy Manager, Environmental Restoration	

Chief Inspector: Glenn Richardson	Title: Task Manager	Organization: Environmental Restoration
Assistant Inspector: Mario Vasquez	Title: ER Safety	Organization: Environmental Restoration

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color photographs is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photograph log entry will be made for each photograph taken.
5. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified for field notes; however, they must be legible and in sufficient detail to enable review by succeeding inspectors and the responsible agency.
6. This unit will be inspected quarterly with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photograph log attached, and recommendations and conclusions.

B. PREPARATION (To be competed prior to site visit)	YES	NO	EXPLANATION (required if shaded box is checked)
1. Has the Post-Closure Permit been reviewed?	✓		
2. Has the Post-Closure Permit application been reviewed?	✓		
3. Has the Post-Closure Plan been reviewed?	✓		
4. Have the site as-built plans and site base map been reviewed?	✓		
5. Have the previous inspection reports been reviewed?	✓		
a. Were anomalies or trends detected on previous inspections?	✓		A trend for subsidence features is common on the east portion of the waste unit cover.
b. Was maintenance performed?	✓		The last subsidence repair was completed on 5/14/07.
If maintenance was performed, has a copy of the maintenance records been obtained?	✓		NA — A daily report & email notification to NNSA confirm completion. Also, field notes are available.
6. Have the site maintenance and repair records been reviewed?	✓		
a. If so, has site repair resulted in a change from as-built conditions?		✓	NA
b. If yes (to 6a), are revised as-built plans available that reflect repair changes?			NA ✓

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

C. SITE INSPECTION PREPARATION

Assemble the following, as needed, to conduct inspections:

a. Camera, film, and batteries
b. Keys to locks
c. Clipboard
d. Tape measure
e. Radio, pager, etc.
f. Previous Post-Closure Report, Inspection Checklists, repair records, and as-built plans
g. Other miscellaneous support equipment

D. SITE INSPECTION

1. Adjacent off-site features:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Are there any new activities or features in the vicinity that could potentially affect the site (e.g., activities that change the flow of surface water or are encroaching the unit)?		✓	
2. Fences, gates, and signs:	**YES**	**NO**	**EXPLANATION (required if shaded box is checked)**
a. Is there damage to or a break in the fence?		✓	
b. Is there damage to or a break in the chicken wire fence?		✓	
c. Have any fenceposts been damaged or their anchoring weakened?		✓	
d. Is the gate intact and functional?	✓		
e. Does the gate show evidence of tampering or damage?		✓	
f. Was the gate locked?	✓		
g. Are any of the use restriction signs damaged or missing?		✓	
h. Are all use restriction signs legible?	✓		
i. How many use restriction signs need to be replaced?	0		
j. Other?			NA ✓
3. Waste unit cover (Western portion, "ax"):	**YES**	**NO**	**EXPLANATION** (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		✓	
b. Is there evidence of cracking?		✓	
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?	✓		Noticed very minor evidence of animal burrowing that does not warrant corrective action.
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		✓	
h. Other (including trash, debris, etc within fenced area)?			NA ✓

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

4. Waste unit cover (Eastern portion, "bl"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?	✓		Settling imperfections were discovered on south & east edge of the cover.
b. Is there evidence of cracking?	✓		Cracks were noticed >6in deep and extend laterally approx. 3-4 feet on the south & east edge of the cover.
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?	✓		Noticed very minor evidence of animal burrowing that does not warrant corrective action.
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?	✓		Noticed a uniquely large bush on the NE side of the cover.
h. Other (including trash, debris, etc within fenced area)?			NA ✓

5. Subsidence survey markers and TDR Probes:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have any of the 7 subsidence survey markers been disturbed?		✓	
b. Do natural processes threaten the integrity of any subsidence survey marker?		✓	
c. Is there excessive vegetation around the subsidence survey markers?		✓	
d. Is there any evidence that TDR probes have been disturbed or the wires damaged?		✓	
e. Other?			NA ✓

6. Photograph Instructions:

A total of 8 photographs are required to be taken during each inspection of CAU 110. Additional photographs may also be taken. The required photographs shall be taken as follows:

- Four (4) from the center of the unit, one in each compass direction (i.e., N, S, E, W) and
- Four (4) of the unit from outside the fence, one in each compass direction.

7. Photograph Documentation:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have all photographs been taken as required by the photograph instructions?	✓		
b. Has a photograph log been prepared?	✓		Log number:
c. How many photographs were taken?	8		
d. Other?			NA ✓

E. FIELD CONCLUSIONS	YES	NO	EXPLANATION (required if shaded box is checked)
1. Are more frequent inspections required?		✓	
2. Are existing maintenance/repair actions satisfactory?	✓		
3. Is other maintenance/repair necessary?	✓		Subsidence repairs are necessary within 60 days of discovery.

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

E. FIELD CONCLUSIONS (continued)	YES	NO	EXPLANATION (required if shaded box is checked)
4. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	

Person/Agency to whom report was made:

5. Field conclusions/recommendations: Settling imperfections (cracks) were discovered in two areas on the cover (South & east edge of cover) that were greater than 6 inches deep and extended 3-4 ft. laterally. Repairs are necessary within 60 days. The signs, fencing, and surface grade monuments were in good condition. A large shrub bush was noticed approx. 3 ft. in height. Minor evidence of animal burrowing, but nothing that would require a corrective action.

F. CERTIFICATION

I have conducted an inspection of CAU 110, Area 3 WMD U-3ax/bl Crater, in accordance with the procedures of the Post-Closure Permit (including the Post-Closure Plan) as recorded on this checklist, attached sheets, field notes, photographs, and photograph logs.

Chief Inspector's Signature: /s/ Glenn Richardson	Date: 9/27/07
Printed Name: Glenn Richardson	Title: Task Manager

Attachments (check if attached):

- ☑ Field Notes
- ☐ Photos
- ☐ Maintenance records

RCRA Post Closure Inspections - September 27, 2007

Personnel: Glenn Richardson - NSTec Task Manager
Mario Vasquez - NSTec ER Safety
Visitors: Ted Zaferatos - NDEP
Greg Doyle - NSTec Engineering Geologist
Scope: Perform quarterly and semi-annual post closure site inspections for the following CAUs: 91, 92, 110, and 112.

Equipment: Camera
Weather Conditions: Clear Skies, Partly Sunny, 72°
PPE: Standard Level D (hard hats are optional)

Photo Log - RCRA Sites

CAU 91: ① Photos taken inside Perimeter Fence - Facing: North, South, East, West

② Photos taken North & South direction inside Perimeter Fence

③ Photos taken outside Perimeter Fence - Facing: North, West, South, East

CAU 110: ④ Photos taken Outside Perimeter Fence - Facing: North, West, South, East

⑤ Photos taken Inside Perimeter Fence - Facing: North, East, South, West

Cont. on Pg. 167 →

SIGNATURE /s/ Glenn Richardson			DATE 9/27/07
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Work continued from Page 166

CAU 92: (4) Photos taken Inside Perimeter Fence - Facing: North
South
East
West

(7) Photos taken Outside Perimeter Fence - Facing: North (2 pics.)
West (2 pics.)
South (1 pic.)
East (1 pic.)

8:35AM - Left Mercury in route to the Area 3 U-3fi Injection Well (CAU 91).

9:18AM - Arrived at CAU 91 U3fi Injection Well.
Tailgate Safety Briefing was held w/ NDEP.
- We discussed slips/trips/falls. Buddy system when walking around RCRA sites.
- We discussed biological hazards and always stay hydrated with water
- especially in heat stress conditions.
- Nearest medical is in Area 6 or Area 23.

9:42AM - Performed site inspection of CAU 91. There was no evidence of vegetation growth or animal burrows inside of the fenced area. Also, the signage and fencing were in good condition. Photo documentation of the site was taken. There are no issues or concerns. Left site heading to CAU 110.

9:49AM - Arrived at CAU 110 Area 3 WMD U3ax/bl crater and took photos.

10:38AM - Performed site inspection of CAU 110. Greg Doyle met us at the site and participated in the inspection. We noticed minor evidence of animal burrows, but nothing significant to warrant a corrective action. As we approached the east portion of the vegetative cover ("bl"), we noticed cracks in two major areas. Cracks that were greater than 6 in. deep and extended horizontally on the surface from 3-4ft. were discovered on the south edge (near TDR unit) and east edge of the

Work continued to Page 168

SIGNATURE /s/ Glenn Richardson			DATE 9/27/07
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

RCRA Inspections Cont.

cover. Notification is required to NNSA and subsidence repairs are required within 60 days. The UR signage and fencing are in good condition. Also, we discovered a uniquely tall shrub that had grown on the northeast side of the cover. The shrub is about 3-3½ ft. tall. D. Anderson will be contacted as a BMP to determine if the shrub needs to be cut. Photo documentation was taken to confirm the two subsidence features. After taking photos, we (NSTec) discussed our observations with NDEP and departed the site heading to CAU 92. Greg Doyle returned to Mercury.

10:53 AM - Arrived at CAU 92 - Area 6 Decon Pond Facility

11:12 AM - Performed site inspection of CAU 92. The UR signs, fencing, and wave barriers were in excellent condition. The standing water in the NE corner, originally identified during the precipitation event on 9/24/07, had evaporated. The waste unit cover did not shows signs of animal intrusion. The vegetation growth on the north and east edge of the cover had matured since the last removal activity in May 2007. As a result, vegetation removal activities are necessary within 60 days. Photo documentation was taken before exiting the site.

11:52 AM - Arrived at CAU 112 - Area 23 Hazardous Waste Trenches

12:04 PM - Performed site inspection drive-by of CAU 112. The signage, fencing, and aboveground monuments were in great condition. Also, there was no evidence of vegetation growth on the cover. This site had no issues or concerns. We left the site at 12:08 PM. NDEP headed back to LV office.

/s/ Glenn Richardson

12:10 - End of RCRA Inspections

SIGNATURE			DATE
/s/ Glenn Richardson			9/27/07
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Inspection Requirements: **Quarterly**

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

Inspection Date and Time: 12/18/07	Reason for Inspection: Quarterly
Date of Last Post-Closure Inspection: Sept 27, 2007	Reason for Last Post-Closure Inspection: Quarterly
Responsible Entity: NSTec Environmental Restoration, Nevada Test Site, Mercury, Nevada	
Responsible Facility Owner: Jeffrey L. Smith, Deputy Manager, Environmental Restoration	

Chief Inspector: Glenn Richardson	Title: Task Manager	Organization: Environmental Restoration
Assistant Inspector: Dudley Emler	Title: Sr. Scientist	Organization: Environmental Restoration

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color photographs is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photograph log entry will be made for each photograph taken.
5. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified for field notes; however, they must be legible and in sufficient detail to enable review by succeeding inspectors and the responsible agency.
6. This unit will be inspected quarterly with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photograph log attached, and recommendations and conclusions.

B. PREPARATION (To be competed prior to site visit)	YES	NO	EXPLANATION (required if shaded box is checked)
1. Has the Post-Closure Permit been reviewed?	✓		
2. Has the Post-Closure Permit application been reviewed?	✓		
3. Has the Post-Closure Plan been reviewed?	✓		
4. Have the site as-built plans and site base map been reviewed?	✓		
5. Have the previous inspection reports been reviewed?	✓		
a. Were anomalies or trends detected on previous inspections?		✓	Cracks & Subsidence
b. Was maintenance performed?		✓	Fx Reports Completed Oct 24
If maintenance was performed, has a copy of the maintenance records been obtained?	✓		NA
6. Have the site maintenance and repair records been reviewed?	✓		
a. If so, has site repair resulted in a change from as-built conditions?		✓	NA
b. If yes (to 6a), are revised as-built plans available that reflect repair changes?			NA

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

C. SITE INSPECTION PREPARATION

Assemble the following, as needed, to conduct inspections:

a. Camera, film, and batteries
b. Keys to locks
c. Clipboard
d. Tape measure
e. Radio, pager, etc.
f. Previous Post-Closure Report, Inspection Checklists, repair records, and as-built plans
g. Other miscellaneous support equipment

D. SITE INSPECTION

1. Adjacent off-site features:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Are there any new activities or features in the vicinity that could potentially affect the site (e.g., activities that change the flow of surface water or are encroaching the unit)?		✓	

2. Fences, gates, and signs:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Is there damage to or a break in the fence?		✓	
b. Is there damage to or a break in the chicken wire fence?		✓	
c. Have any fenceposts been damaged or their anchoring weakened?		✓	
d. Is the gate intact and functional?	✓		
e. Does the gate show evidence of tampering or damage?		✓	
f. Was the gate locked?	✓		
g. Are any of the use restriction signs damaged or missing?		✓	
h. Are all use restriction signs legible?	✓		
i. How many use restriction signs need to be replaced?	0		
j. Other?			NA

3. Waste unit cover (Western portion, "ax"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		✓	
b. Is there evidence of cracking?		✓	
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?	✓		Minor burrows on Cover
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		✓	
h. Other (including trash, debris, etc within fenced area)?			NA

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

4. Waste unit cover (Eastern portion, "bx"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?	✓		EAST Side New fracture & depression Evident
b. Is there evidence of cracking?	✓		Ring Bx Surrounding 10' Depression
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?	✓		
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		✓	
h. Other (including trash, debris, etc within fenced area)?			NA ✓

5. Subsidence survey markers and TDR Probes:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have any of the 7 subsidence survey markers been disturbed?		✓	
b. Do natural processes threaten the integrity of any subsidence survey marker?		✓	
c. Is there excessive vegetation around the subsidence survey markers?		✓	
d. Is there any evidence that TDR probes have been disturbed or the wires damaged?		✓	
e. Other?			NA ✓

6. Photograph Instructions:

A total of 8 photographs are required to be taken during each inspection of CAU 110. Additional photographs may also be taken. The required photographs shall be taken as follows:

- Four (4) from the center of the unit, one in each compass direction (i.e., N, S, E, W) and
- Four (4) of the unit from outside the fence, one in each compass direction.

7. Photograph Documentation:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have all photographs been taken as required by the photograph instructions?	✓		
b. Has a photograph log been prepared?			Log number:
c. How many photographs were taken?	8		
d. Other?	✓		NA ✓ photo's of depression & Fx.

E. FIELD CONCLUSIONS	YES	NO	EXPLANATION (required if shaded box is checked)
1. Are more frequent inspections required?		✓	
2. Are existing maintenance/repair actions satisfactory?	✓		
3. Is other maintenance/repair necessary?	✓		Fx Require Repair with 60 days

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

E. FIELD CONCLUSIONS (continued)	YES	NO	EXPLANATION (required if shaded box is checked)
4. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	
Person/Agency to whom report was made:			
5. Field conclusions/recommendations: A new depression & fractures were noted South of the existing Subsidence area. approximately 10-15' diameter with a Single Ring fracture along the perimeter. Size >1m & will Require NNSA & NDEP Notification & Repair within 60 days.			

F. CERTIFICATION

I have conducted an inspection of CAU 110, Area 3 WMD U-3ax/bl Crater, in accordance with the procedures of the Post-Closure Permit (including the Post-Closure Plan) as recorded on this checklist, attached sheets, field notes, photographs, and photograph logs.

Chief Inspector's Signature:	Date:
Printed Name:	Title:

Attachments (check if attached):

- ☐ Field Notes
- ☐ Photos
- ☐ Maintenance records

Work continued from Page ____

(CAU 92) Area 6 Decon Pond Precipitation Inspection 12/11/07

Scope:
Arrived @ 1:07 PM to inspect level of precipitation on the waste unit cover. Received an e-mail notification from the UCC MEDA Station that the level of precipitation exceeded our regulatory threshold of 0.5 in. on 12/8/07 (Saturday). The precipitation event reached a level of 0.8 in.

Personnel: Glenn Richardson, Task Manager Equipment: Camera, Radio
Dudley Emer, Sr. Scientist

Performed a site walkdown around the Decon Pond fenced area. Noticed standing water inside the NE corner of the fenced area, but was not observed on the waste unit cover. The fencing and UR signage is in good condition. Also, the wave barriers are not damaged and appear to be maintaining their stability. The site is in great condition and was not adversely affected by the precipitation event. There are no issues or concerns associated with this site. Leaving the site at 1:23 PM

/s/ Glenn Richardson

RCRA Post Closure Inspections - December 18, 2007

Personnel: Glenn Richardson - NSTec Task Mgr.
Dudley Emer - NSTec Senior Scientist, Greg Doyle - NSTec Engine
Geologi
Visitors: Ted Zaferatos - NDEP
Kevin Cabble, Janis Romo - NNSA

Work continued to Page 170

SIGNATURE /s/ Glenn Richardson DATE 12/18/07

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Scope: Perform quarterly and semiannual post closure site inspections for the following CAUs: 90, 92, 110, + 112

Equipment: Camera
Weather Conditions: Cloudy, Extremely Low - Mid 30's
PPE: Standard Level D (hard hats are optional)

8:55AM - Left Mercury in Route to Area 2 Bitcutter Site
9:38AM - Arrived @ CAU 90 Bitcutter
Performed a Tailgate Safety Briefing w/ NNSA + NDEP.
- Discussed Cold Stress conditions, Slips/trips/fall hazards
- " balanced consumption of water to prevent dehydration
- " buddy system during walkdown

9:45AM - Performed site inspection @ CAU 90. Overall site conditions are good. There are no signs of vegetation growth. The chain link fencing and signage are in good condition. Noticed a small animal burrow inside the west fenced area; however, this not significant enough to warrant a corrective action.
9:54AM - Leaving CAU 90 in route to CAU 110 U3ax/bl.
10:10AM - Arrived @ CAU 110 and started site inspection. Greg Doyle met us at the site and participated in the site inspection. The fencing and signage looked good and was well-maintained. There were a few animal burrows identified. A follow-up action will be taken to contact D. Anderson (ecological services) to plan a site visit prior to the March inspection period. We also discovered a new crack greater than 6 ft. on the surface (lateral extent) on the east edge of the cover. Photos were taken for documentation and repair is necessary within 60 days. After discussing our observations

SIGNATURE /s/ Glenn Richardson
DATE 12/18/07
DISCLOSED TO AND UNDERSTOOD BY
DATE
WITNESS
DATE

Work continued from Page 170

with NNSA and NDEP, we departed the site in route to CAU 92. Greg Doyle returned to Mercury after the 110 inspection.

11:18 AM - Arrived @ CAU 92 and performed site inspection. Overall site conditions are great. The fencing and UR signage are well maintained. No evidence of vegetation growth. The wave barriers are not damaged. Photo documentation was taken at this site. No issues or concerns. Left CAU 92 in route to CAU 112.

12:02 PM - Arrived @ CAU 112 and performed a site inspection. Drove around Area 23 waste trenches to find no observations that warranted a corrective action. The UR signs and aboveground monuments are in good condition. No evidence of vegetation growth. Left CAU 112 and headed to ER Dorms.

12:10 PM - Debrief of all observations was discussed w/ NNSA and NDEP. NNSA + NDEP left the dorms in route to Mercury. End of Inspections at 12:15 PM.

Note: Photos that were taken will be logged on the ER Shared Drive.

/s/ Glenn Richardson

SIGNATURE	/s/ Glenn Richardson		DATE 12/18/07
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

Inspection Date and Time: 3/26/08 10:20AM	Reason for Inspection: Quarterly
Date of Last Post-Closure Inspection: 12/18/07	Reason for Last Post-Closure Inspection: Quarterly
Responsible Entity: NSTec Environmental Restoration, Nevada Test Site, Mercury, Nevada	
Responsible Facility Owner: Jeffrey L. Smith, Deputy Manager, Environmental Restoration	

Chief Inspector: Glenn Richardson	Title: Task Manager	Organization: Environmental Restoration
Assistant Inspector: Mike Floyd	Title: Field Technical Lead	Organization: Environmental Restoration

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color photographs is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photograph log entry will be made for each photograph taken.
5. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified for field notes; however, they must be legible and in sufficient detail to enable review by succeeding inspectors and the responsible agency.
6. This unit will be inspected quarterly with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photograph log attached, and recommendations and conclusions.

B. PREPARATION (To be competed prior to site visit)	YES	NO	EXPLANATION (required if shaded box is checked)
1. Has the Post-Closure Permit been reviewed?	✓		
2. Has the Post-Closure Permit application been reviewed?	✓		
3. Has the Post-Closure Plan been reviewed?	✓		
4. Have the site as-built plans and site base map been reviewed?	✓		
5. Have the previous inspection reports been reviewed?	✓		
a. Were anomalies or trends detected on previous inspections?	✓		Subsidence cracks were identified during the Sept. 2007 and Dec. 2007 inspections.
b. Was maintenance performed?	✓		Subsidence crack repairs were completed in Oct. 2007 and Jan. 2008.
If maintenance was performed, has a copy of the maintenance records been obtained?	✓		NA — An electronic copy of the maintenance records is available and has been placed on the ER Share Drive.
6. Have the site maintenance and repair records been reviewed?	✓		
a. If so, has site repair resulted in a change from as-built conditions?		✓	NA
b. If yes (to 6a), are revised as-built plans available that reflect repair changes?			NA ✓

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

C. SITE INSPECTION PREPARATION

Assemble the following, as needed, to conduct inspections:

a. Camera, film, and batteries
b. Keys to locks
c. Clipboard
d. Tape measure
e. Radio, pager, etc.
f. Previous Post-Closure Report, Inspection Checklists, repair records, and as-built plans
g. Other miscellaneous support equipment

D. SITE INSPECTION

1. Adjacent off-site features:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Are there any new activities or features in the vicinity that could potentially affect the site (e.g., activities that change the flow of surface water or are encroaching the unit)?		✓	

2. Fences, gates, and signs:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Is there damage to or a break in the fence?		✓	
b. Is there damage to or a break in the chicken wire fence?		✓	
c. Have any fenceposts been damaged or their anchoring weakened?		✓	
d. Is the gate intact and functional?	✓		
e. Does the gate show evidence of tampering or damage?		✓	
f. Was the gate locked?	✓		
g. Are any of the use restriction signs damaged or missing?		✓	
h. Are all use restriction signs legible?	✓		
i. How many use restriction signs need to be replaced?	0		
j. Other?			NA ✓

3. Waste unit cover (Western portion, "ax"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		✓	
b. Is there evidence of cracking?		✓	
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?	✓		A small cluster of animal burrows were noticed on the cover.
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		✓	
h. Other (including trash, debris, etc within fenced area)?			NA ✓

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

4. Waste unit cover (Eastern portion, "bx"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		✓	
b. Is there evidence of cracking?		✓	
c. Is there evidence of erosion (wind or water)?		✓	
d. Is there evidence of human intrusion onto the cover?		✓	
e. Is there evidence of large animal intrusion onto the cover?		✓	
f. Is there evidence of animal burrowing?			
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		✓	
h. Other (including trash, debris, etc within fenced area)?			NA ✓

5. Subsidence survey markers and TDR Probes:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have any of the 7 subsidence survey markers been disturbed?		✓	
b. Do natural processes threaten the integrity of any subsidence survey marker?		✓	
c. Is there excessive vegetation around the subsidence survey markers?		✓	
d. Is there any evidence that TDR probes have been disturbed or the wires damaged?		✓	
e. Other?			NA ✓

6. Photograph Instructions:

A total of 8 photographs are required to be taken during each inspection of CAU 110. Additional photographs may also be taken. The required photographs shall be taken as follows:

- Four (4) from the center of the unit, one in each compass direction (i.e., N, S, E, W) and
- Four (4) of the unit from outside the fence, one in each compass direction.

7. Photograph Documentation:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have all photographs been taken as required by the photograph instructions?	✓		
b. Has a photograph log been prepared?	✓		Log number:
c. How many photographs were taken?	8		
d. Other?			NA

E. FIELD CONCLUSIONS	YES	NO	EXPLANATION (required if shaded box is checked)
1. Are more frequent inspections required?		✓	
2. Are existing maintenance/repair actions satisfactory?	✓		the previous subsidence crack repairs are holding very well.
3. Is other maintenance/repair necessary?		✓	

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

E. FIELD CONCLUSIONS (continued)	YES	NO	EXPLANATION (required if shaded box is checked)
4. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	

Person/Agency to whom report was made:

5. Field conclusions/recommendations: The fencing and signage were in good condition. Also, the surface monuments were intact and not damaged. Subsidence crack repairs that were performed in Jan. 2008 are holding very well. There were no new cracks discovered during the site inspection. There were small clusters of animal burrows noticed that will be addressed during the ~~small~~ mammal trapping exercises planned in May 2008. Lastly, the vegetation growth appeared to be in good condition.

F. CERTIFICATION

I have conducted an inspection of CAU 110, Area 3 WMD U-3ax/bl Crater, in accordance with the procedures of the Post-Closure Permit (including the Post-Closure Plan) as recorded on this checklist, attached sheets, field notes, photographs, and photograph logs.

Chief Inspector's Signature: /s/ Glenn Richardson	Date: 3/26/08
Printed Name: Glenn Richardson	Title: Task Manager

Attachments (check if attached):

- ☑ Field Notes
- ☐ Photos
- ☐ Maintenance records

RCRA Post Closure Inspections - March 26, 2008

Personnel: Glenn Richardson - NSTec Task Manager
Greg Doyle - NSTec Engineering Geologist / ~~Steve Mumms~~ Paul Perez - NSTec Lead RCT
Mike Floyd ER - NSTec Field Technical Lead
Visitors: Ted Zaferatos - NDEP
Kevin Cabble - NNSA

Scope: Perform quarterly and semi-annual post closure site inspections for the following CAUs: 91, 92, 110, and 112

Equipment: Camera, Measurement Ruler, Radiological Survey/Screening Equipment

Weather Conditions: Sunny, Mid to Low 50s
PPE: Standard Level D

9:38AM- Left Mercury in Route to Area 3 ~~U3fi Injection Well~~ U3ax/bl BR
10:20AM- Arrived @ CAU ~~110~~ (UR MA) ~~U3fi Injection Well~~ AR U3 ax/bl (Agenda was modified in route to Area 3)
Performed a Tailgate Safety Briefing w/ NNSA & NDEP
- Discussed desert terrain and the potential for slips, trips, and falls
- Biological hazards and being cognizant of surroundings.
- Making sure a balanced consumption of water is maintained.
- Be aware of potential heat stress conditions as the morning progresses
- Maintain the buddy system throughout the walkdown
- Lastly, "When in doubt, ask the question"

Work continued to Page 175

SIGNATURE /s/ Glenn Richardson			DATE 3/26/08
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Performed site walkdown of U3ax/bl. The ~~previous~~ most recent subsidence repair areas were observed and determined stable and in good condition. There were no new cracks or settling imperfections discovered by the engineering representative or walkdown group. The vegetation was mature in growth and the signage and fencing were in good condition. The white snow fencing at the initial entrance showed signs of degrading over time, but still maintained a physical barrier at the site. No corrective actions are necessary at this time, but a more durable fence could be considered as a best management practice in the near future. There was evidence of animal burrowing noticed in clustered areas; however, no immediate actions were warranted. Instead, the ecological services organization will be contacted to confirm their schedule for performing small mammal trapping activities prior to the next inspection period in June 2008. There were no issues or concerns identified by NNSA or NDEP that warranted an immediate follow-up action. (Note: Upon arrival at U3ax/bl, we were greeted by a geologist tour group, but their presence did not intefere or affect the inspection of the engineered cover.)

11:05 AM - Leaving U3ax/bl in route to CAU 91.

11:10 AM - Arrived @ CAU 91 Area 3 U3fi Injection Well

Performed our inspection of the site. The signage and fencing were in good condition. There was no evidence of animal burrowing at the site. Noticed a large amount of vegetation that had grown within the last 6-month period. Vegetation removal is necessary within 60 days. Also, herbicide will be sprayed to prevent vegetation growth in the future.

Work continued to Page

SIGNATURE /s/ Glenn Richardson DATE 3/26/08

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Photo documentation was ~~performed~~ BR taken as well.

~~11:20~~ 11:20 AM - Leaving U3fi in route to CAU 92.

11:40 AM - Arrived @ CAU 92 Decon Pond - (URMA)

Performed our inspection of the site to find signage and fencing in great condition. Also, the wave barriers were in good condition. There was no evidence of animal burrowing. Noticed small signs of vegetation starting to sprout on the cover. This site should be included in the list to receive vegetation removal. Also, herbicide will be applied to the site. Photo documentation was taken at the site as well.

12:00 PM - Leaving Decon Pond in route to CAU 112

12:28 PM - Arrived @ CAU 112 Area 23 Hazardous Waste Trenches

Performed a drive around inspection of the site. Noticed one strand of barb wire loose on the east side of the fence. In addition, noticed vegetation sprouting through the rip-rap on top BR of the cover and the cover's slide slope. Barb wire will be replaced or repaired. Vegetation removal activities will be performed and barb wire fencing repaired within 60 days.

12:35 PM - Leaving CAU 112 for lunch. End of RCRA inspections.

Note: RCT coverage was provided for the RCRA Inspections as an ER BMP.

/s/ Glenn Richardson

SIGNATURE /s/ Glenn Richardson			DATE 3/26/08
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

Inspection Date and Time: 6/5/08 845a	Reason for Inspection: Quarterly
Date of Last Post-Closure Inspection: 3/26/08	Reason for Last Post-Closure Inspection: QUARTERLY
Responsible Entity: NSTec Environmental Restoration, Nevada Test Site, Mercury, Nevada	
Responsible Facility Owner: Jeffrey L. Smith, Deputy Manager, Environmental Restoration	

Chief Inspector: Mike Floyd	Title: FTL	Organization: Environmental Restoration
Assistant Inspector: Robert Grant	Title: FTL	Organization: Environmental Restoration

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color photographs is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photograph log entry will be made for each photograph taken.
5. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified for field notes; however, they must be legible and in sufficient detail to enable review by succeeding inspectors and the responsible agency.
6. This unit will be inspected quarterly with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photograph log attached, and recommendations and conclusions.

B. PREPARATION (To be competed prior to site visit)	YES	NO	EXPLANATION (required if shaded box is checked)
1. Has the Post-Closure Permit been reviewed?	X		
2. Has the Post-Closure Permit application been reviewed?	X		
3. Has the Post-Closure Plan been reviewed?	X		
4. Have the site as-built plans and site base map been reviewed?	X		
5. Have the previous inspection reports been reviewed?	X		
a. Were anomalies or trends detected on previous inspections?		X	
b. Was maintenance performed?		X	
If maintenance was performed, has a copy of the maintenance records been obtained?	NSE X		NA X
6. Have the site maintenance and repair records been reviewed?	X		
a. If so, has site repair resulted in a change from as-built conditions?		X	NA
b. If yes (to 6a), are revised as-built plans available that reflect repair changes?			NA X

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

C. SITE INSPECTION PREPARATION

Assemble the following, as needed, to conduct inspections:

a. Camera, film, and batteries
b. Keys to locks
c. Clipboard
d. Tape measure
e. Radio, pager, etc.
f. Previous Post-Closure Report, Inspection Checklists, repair records, and as-built plans
g. Other miscellaneous support equipment

D. SITE INSPECTION

1. Adjacent off-site features:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Are there any new activities or features in the vicinity that could potentially affect the site (e.g., activities that change the flow of surface water or are encroaching the unit)?		X	

2. Fences, gates, and signs:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Is there damage to or a break in the fence?		X	
b. Is there damage to or a break in the chicken wire fence?		X	
c. Have any fenceposts been damaged or their anchoring weakened?		X	
d. Is the gate intact and functional?	X		
e. Does the gate show evidence of tampering or damage?		X	
f. Was the gate locked?	X		
g. Are any of the use restriction signs damaged or missing?		X	
h. Are all use restriction signs legible?	X		
i. How many use restriction signs need to be replaced?			N/A
j. Other?			NA X

3. Waste unit cover (Western portion, "ax"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		X	
b. Is there evidence of cracking?		X	
c. Is there evidence of erosion (wind or water)?		X	
d. Is there evidence of human intrusion onto the cover?		X	
e. Is there evidence of large animal intrusion onto the cover?		X	
f. Is there evidence of animal burrowing?		X	
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?		X	Vegetation in Better Shape than surrounding areas
h. Other (including trash, debris, etc within fenced area)?			NA ✓

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

4. Waste unit cover (Eastern portion, "bx"):	YES	NO	EXPLANATION (Required if shaded box is checked. If checked, specify dimensions, quantity, and/or other information to describe conditions.)
a. Is there evidence of settling?		X	
b. Is there evidence of cracking?		X	
c. Is there evidence of erosion (wind or water)?		X	
d. Is there evidence of human intrusion onto the cover?		X	
e. Is there evidence of large animal intrusion onto the cover?		X	
f. Is there evidence of animal burrowing?		X	
g. Is there a change or difference in vegetation (i.e., is the vegetation growing on the cover inconsistent with the naturally-occurring vegetation growing outside of the unit)?			veg. in forest shape over entire cover
h. Other (including trash, debris, etc within fenced area)?			NA X

5. Subsidence survey markers and TDR Probes:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have any of the 7 subsidence survey markers been disturbed?		X	
b. Do natural processes threaten the integrity of any subsidence survey marker?		X	
c. Is there excessive vegetation around the subsidence survey markers?		X	
d. Is there any evidence that TDR probes have been disturbed or the wires damaged?		X	
e. Other?			NA X

6. Photograph Instructions:

A total of 8 photographs are required to be taken during each inspection of CAU 110. Additional photographs may also be taken. The required photographs shall be taken as follows:

- Four (4) from the center of the unit, one in each compass direction (i.e., N, S, E, W) and — E. N. W. S. } order
- Four (4) of the unit from outside the fence, one in each compass direction. — E. N. W. S. / Taken 6/5/08

7. Photograph Documentation:	YES	NO	EXPLANATION (required if shaded box is checked)
a. Have all photographs been taken as required by the photograph instructions?	X		
b. Has a photograph log been prepared?	X		Log number:
c. How many photographs were taken?		08	CENTER + OUTSIDE ORDER TAKEN E. N. W. S.
d. Other?			NA X

E. FIELD CONCLUSIONS	YES	NO	EXPLANATION (required if shaded box is checked)
1. Are more frequent inspections required?		X	
2. Are existing maintenance/repair actions satisfactory?	Y		
3. Is other maintenance/repair necessary?		Y	

POST-CLOSURE INSPECTION CHECKLIST

CAU 110: AREA 3 WMD U-3ax/bl CRATER - CAS 03-23-04: U-3axbl Subsidence Crater

E. FIELD CONCLUSIONS (continued)	YES	NO	EXPLANATION (required if shaded box is checked)
4. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		X	

Person/Agency to whom report was made:

5. Field conclusions/recommendations: Fence, Signs, Gate all were found to be in Good Condition, General Cover conditions were Good. Veg. Cover Great, Survey Points in Good conditions, TDR Stations Found to Be in good Condition.

F. CERTIFICATION

I have conducted an inspection of CAU 110, Area 3 WMD U-3ax/bl Crater, in accordance with the procedures of the Post-Closure Permit (including the Post-Closure Plan) as recorded on this checklist, attached sheets, field notes, photographs, and photograph logs.

Chief Inspector's Signature: /s/ M Floyd	Date: 6/5/08
Printed Name: see original	Title: FTL

Attachments (check if attached):

- ☐ Field Notes
- ☐ Photos
- ☐ Maintenance records

160 TITLE

PROJECT NO.

Work continued from Page _____ 6/5/08

BOOK NO.

RCRA INSPECTION
CALE 110 (CU 3 A&B)

~~MSF~~
~~NSTEC~~

NSTec.
Mike Floyd - FTL
Robert Green - FTL
Pam Salvato - NCT
Karen Pattee - HP

Scope - Perform Inspection at CAU 110.
Safety - Slip, Trip, Fall, Heat Stress - Uneven/Soft walking Surface Medical A.C.
Weather - Cool (60-70°) Clear, Calm
EQUIP - None
0845 - Arrive on location, Hold Scope + Safety meeting.
0850 - Begin Inspection, Check Fence, Signs, Gate & TDR Stations. All were found to Be in Good Condition.
ENTER Gate And, Check Survey Points & Look for Cracks/ Subsidence, Check Repair Areas, Check for Animal Burrows. Overall the Site Looks to Be in good Condition, Found No Issues or Concerns During WALK down. Collect 8 Photos
0930 - Site Secure

Work continued to Page _____

SIGNATURE see original

DATE 6/5/08

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

PHOTOGRAPH LOG

PHOTOGRAPH NUMBER	DATE	DESCRIPTION
1	09/27/2007	View from center of Area 3 WMD U-3ax/bl cover looking north.
2	09/27/2007	View from center of Area 3 WMD U-3ax/bl cover looking east.
3	09/27/2007	View from center of Area 3 WMD U-3ax/bl cover looking south.
4	09/27/2007	View from center of Area 3 WMD U-3ax/bl cover looking west.
5	09/27/2007	View from Area 3 WMD U-3ax/bl fence looking north.
6	09/27/2007	View from Area 3 WMD U-3ax/bl fence looking east.
7	09/27/2007	View from Area 3 WMD U-3ax/bl fence looking south.
8	09/27/2007	View from Area 3 WMD U-3ax/bl fence looking west.
9	09/27/2007	View of crack on the south edge of the Area 3 WMD U-3ax/bl cover.
10	10/25/2007	View of the south edge of the Area 3 WMD U-3ax/bl cover, after repairs.
11	09/27/2007	View of crack on the east edge of the Area 3 WMD U-3ax/bl cover.
12	10/25/2007	View of the east edge of the Area 3 WMD U-3ax/bl cover, after repairs.
13	12/18/2007	View from center of Area 3 WMD U-3ax/bl cover looking north.
14	12/18/2007	View from center of Area 3 WMD U-3ax/bl cover looking east.
15	12/18/2007	View from center of Area 3 WMD U-3ax/bl cover looking south.
16	12/18/2007	View from center of Area 3 WMD U-3ax/bl cover looking west.
17	12/18/2007	View of crack on the south edge of the Area 3 WMD U-3ax/bl cover.
18	01/29/2008	View of the south edge of the Area 3 WMD U-3ax/bl cover, during repairs.
19	01/29/2008	View of the south edge of the Area 3 WMD U-3ax/bl cover, after repairs.
20	03/26/2008	View from center of Area 3 WMD U-3ax/bl cover looking north.
21	03/26/2008	View from center of Area 3 WMD U-3ax/bl cover looking east.
22	03/26/2008	View from center of Area 3 WMD U-3ax/bl cover looking south.
23	03/26/2008	View from center of Area 3 WMD U-3ax/bl cover looking west.
24	03/26/2008	View from Area 3 WMD U-3ax/bl fence looking north.
25	03/26/2008	View from Area 3 WMD U-3ax/bl fence looking east.
26	03/26/2008	View from Area 3 WMD U-3ax/bl fence looking south.
27	03/26/2008	View from Area 3 WMD U-3ax/bl fence looking west.
28	06/05/2008	View from center of Area 3 WMD U-3ax/bl cover looking north.
29	06/05/2008	View from center of Area 3 WMD U-3ax/bl cover looking east.
30	06/05/2008	View from center of Area 3 WMD U-3ax/bl cover looking south.
31	06/05/2008	View from center of Area 3 WMD U-3ax/bl cover looking west.
32	06/05/2008	View from Area 3 WMD U-3ax/bl fence looking north.

PHOTOGRAPH LOG

PHOTOGRAPH NUMBER	DATE	DESCRIPTION
33	06/05/2008	View from Area 3 WMD U-3ax/bl fence looking east.
34	06/05/2008	View from Area 3 WMD U-3ax/bl fence looking south.
35	06/05/2008	View from Area 3 WMD U-3ax/bl fence looking west.

09/27/2007
1. View from center of Area 3 WMD U-3ax/bl cover looking north.

09/27/2007
2. View from center of Area 3 WMD U-3ax/bl cover looking east.

09/27/2007
3. View from center of Area 3 WMD U-3ax/bl cover looking south.

09/27/2007
4. View from center of Area 3 WMD U-3ax/bl cover looking west.

09/27/2007
5. View from Area 3 WMD U-3ax/bl fence looking north.

09/27/2007
6. View from Area 3 WMD U-3ax/bl fence looking east.

09/27/2007
7. View from Area 3 WMD U-3ax/bl fence looking south.

09/27/2007
8. View from Area 3 WMD U-3ax/bl fence looking west.

09/27/2007
9. View of crack on the south edge of the Area 3 WMD U-3ax/bl cover.

10/25/2007
10. View of the south edge of the Area 3 WMD U-3ax/bl cover, after repairs.

09/27/2007
11. View of crack on the east edge of the Area 3 WMD U-3ax/bl cover.

10/25/2007
12. View of the east edge of the Area 3 WMD U-3ax/bl cover, after repairs.

12/18/2007
13. View from center of Area 3 WMD U-3ax/bl cover looking north.

12/18/2007
14. View from center of Area 3 WMD U-3ax/bl cover looking east.

12/18/2007
15. View from center of Area 3 WMD U-3ax/bl cover looking south.

12/18/2007
16. View from center of Area 3 WMD U-3ax/bl cover looking west.

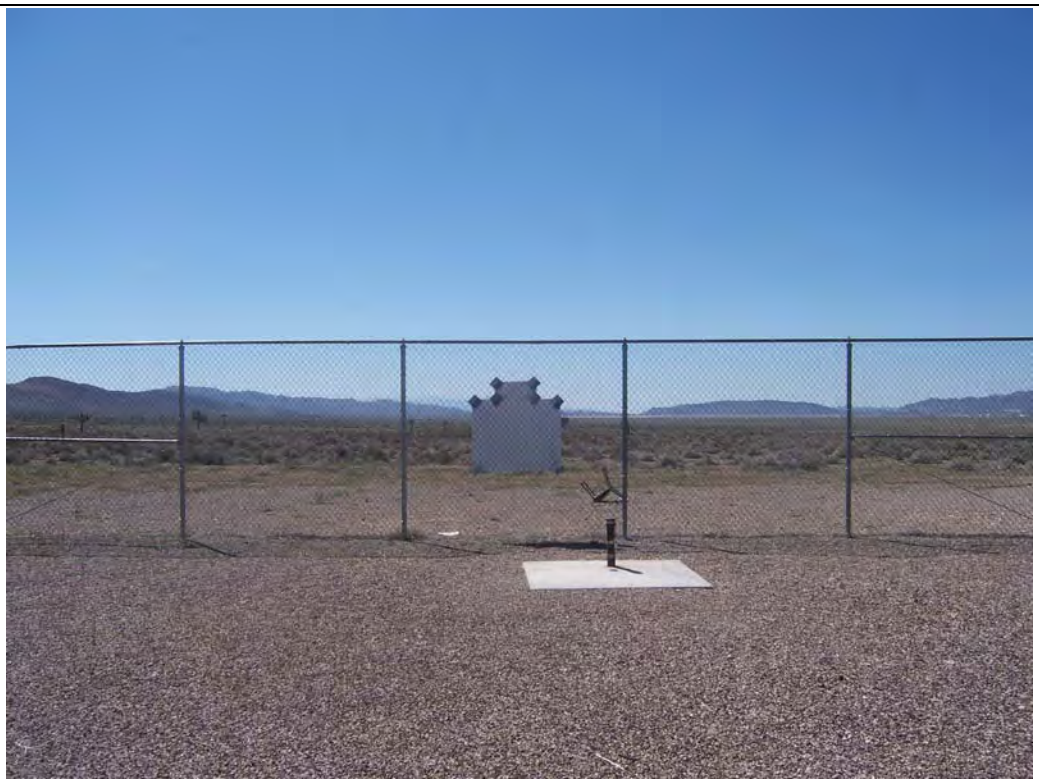
12/18/2007
17. View of crack on the south edge of the Area 3 WMD U-3ax/bl cover.

01/29/2008
18. View of the south edge of the Area 3 WMD U-3ax/bl cover, during repairs.

01/29/2008
19. View of the south edge of the Area 3 WMD U-3ax/bl cover, after repairs.

03/26/2008
20. View from center of Area 3 WMD U-3ax/bl cover looking north.

03/26/2008
21. View from center of Area 3 WMD U-3ax/bl cover looking east.



03/26/2008
22. View from center of Area 3 WMD U-3ax/bl cover looking south.

03/26/2008
23. View from center of Area 3 WMD U-3ax/bl cover looking west.

03/26/2008
24. View from Area 3 WMD U-3ax/bl fence looking north.

03/26/2008
25. View from Area 3 WMD U-3ax/bl fence looking east.

03/26/2008
26. View from Area 3 WMD U-3ax/bl fence looking south.

03/26/2008
27. View from Area 3 WMD U-3ax/bl fence looking west.

06/05/2008
28. View from center of Area 3 WMD U-3ax/bl cover looking north.

06/05/2008
29. View from center of Area 3 WMD U-3ax/bl cover looking east.

06/05/2008
30. View from center of Area 3 WMD U-3ax/bl cover looking south.

06/05/2008
31. View from center of Area 3 WMD U-3ax/bl cover looking west.

06/05/2008
32. View from Area 3 WMD U-3ax/bl fence looking north.

06/05/2008
33. View from Area 3 WMD U-3ax/bl fence looking east.

06/05/2008
34. View from Area 3 WMD U-3ax/bl fence looking south.

06/05/2008
35. View from Area 3 WMD U-3ax/bl fence looking west.

APPENDIX B

MONITORING DATA*

*Monitoring data is summarized in Section 4.0 of this report, and the complete data set is kept in the project files in Mercury, NV.

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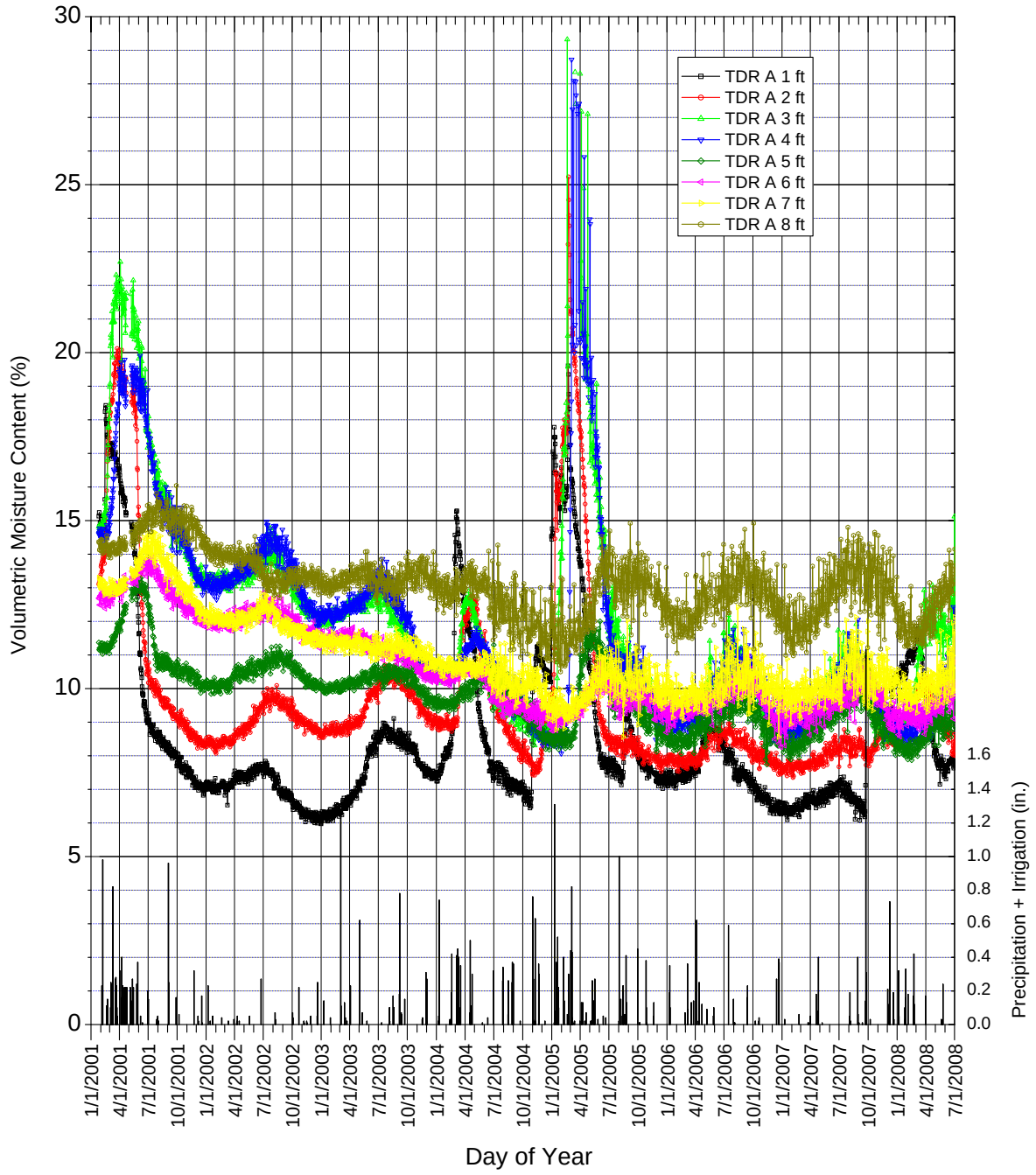
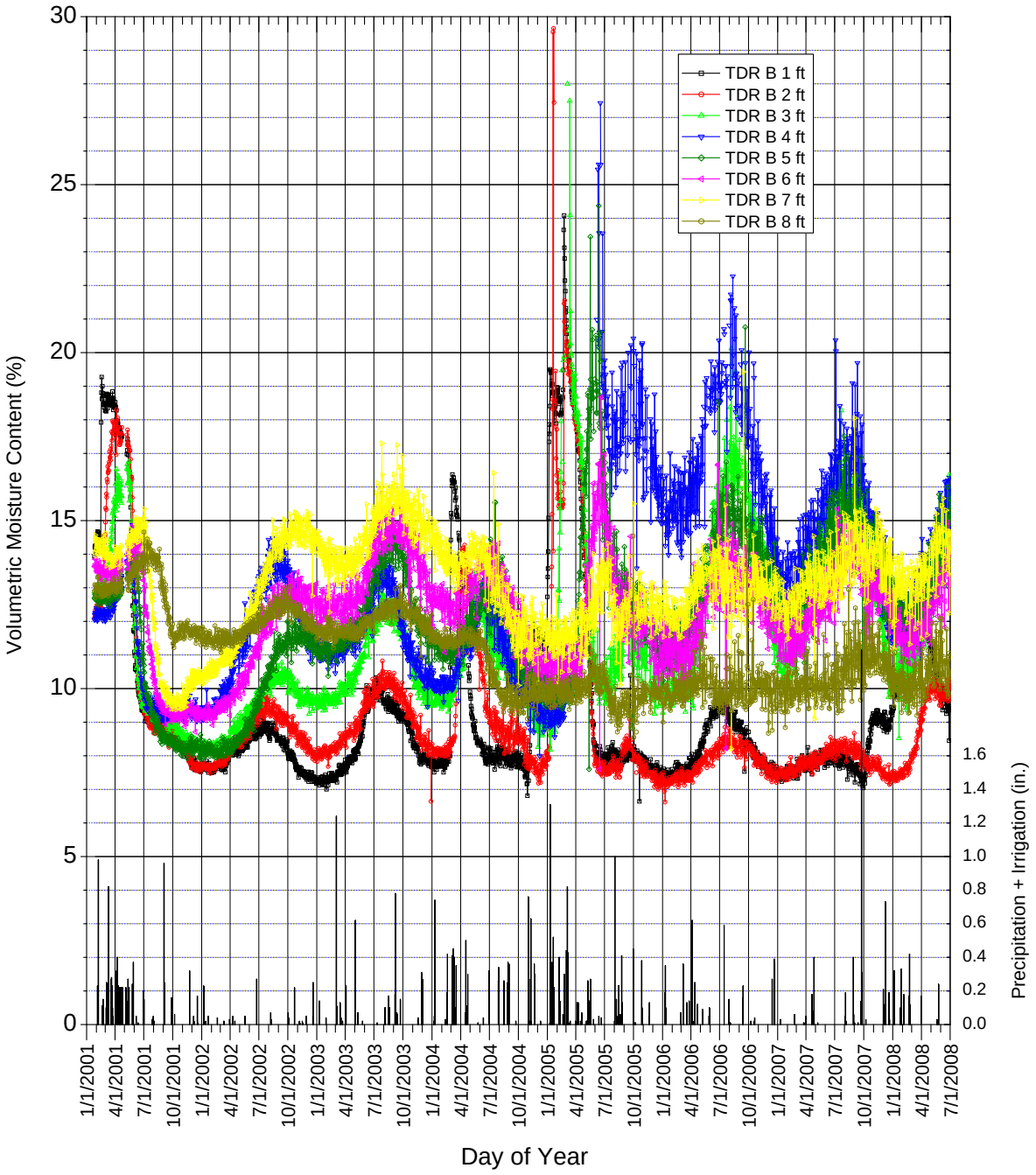
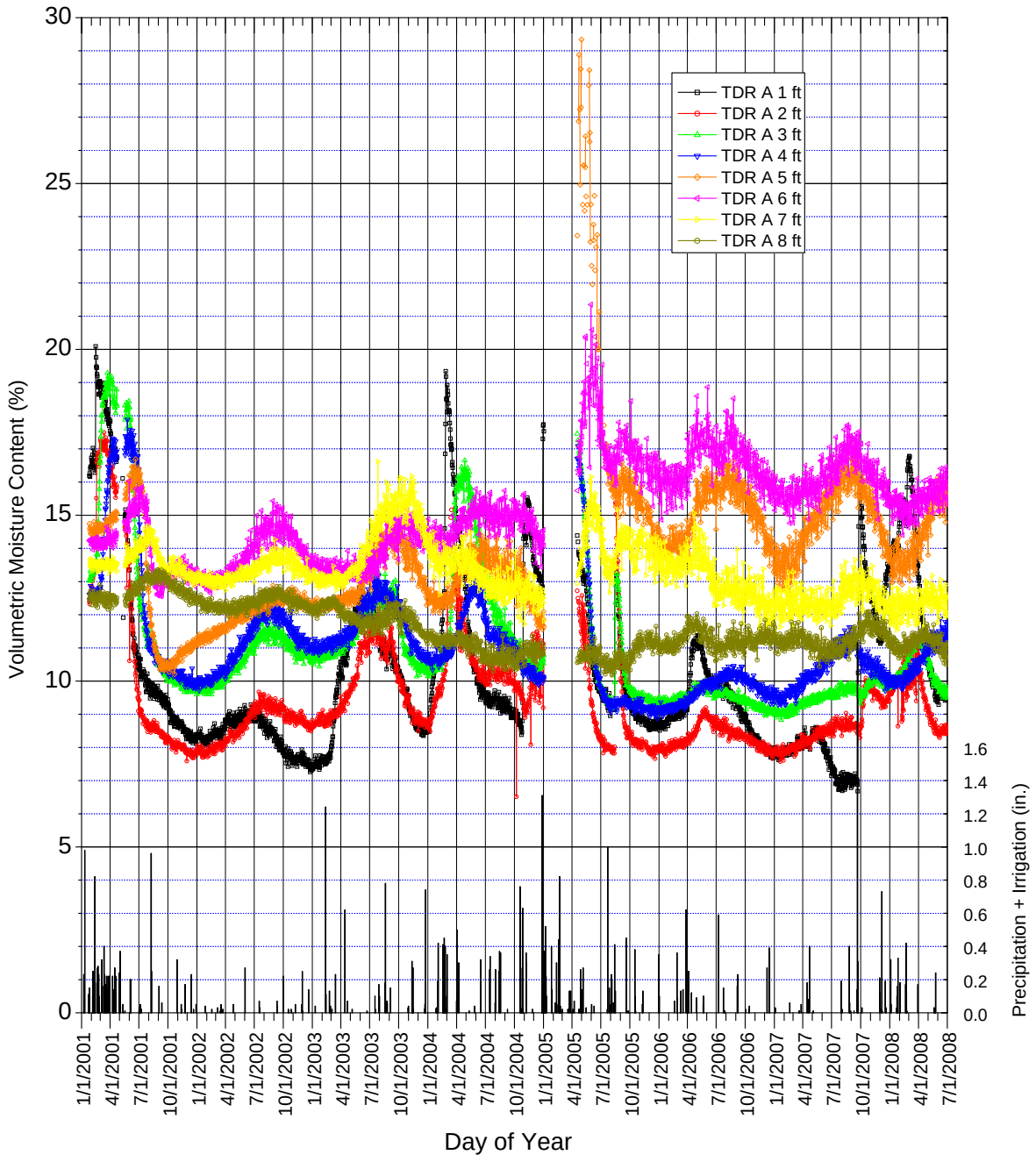


EAST TDR NEST A SOIL MOISTURE CONTENT



EAST TDR NEST B SOIL MOISTURE CONTENT



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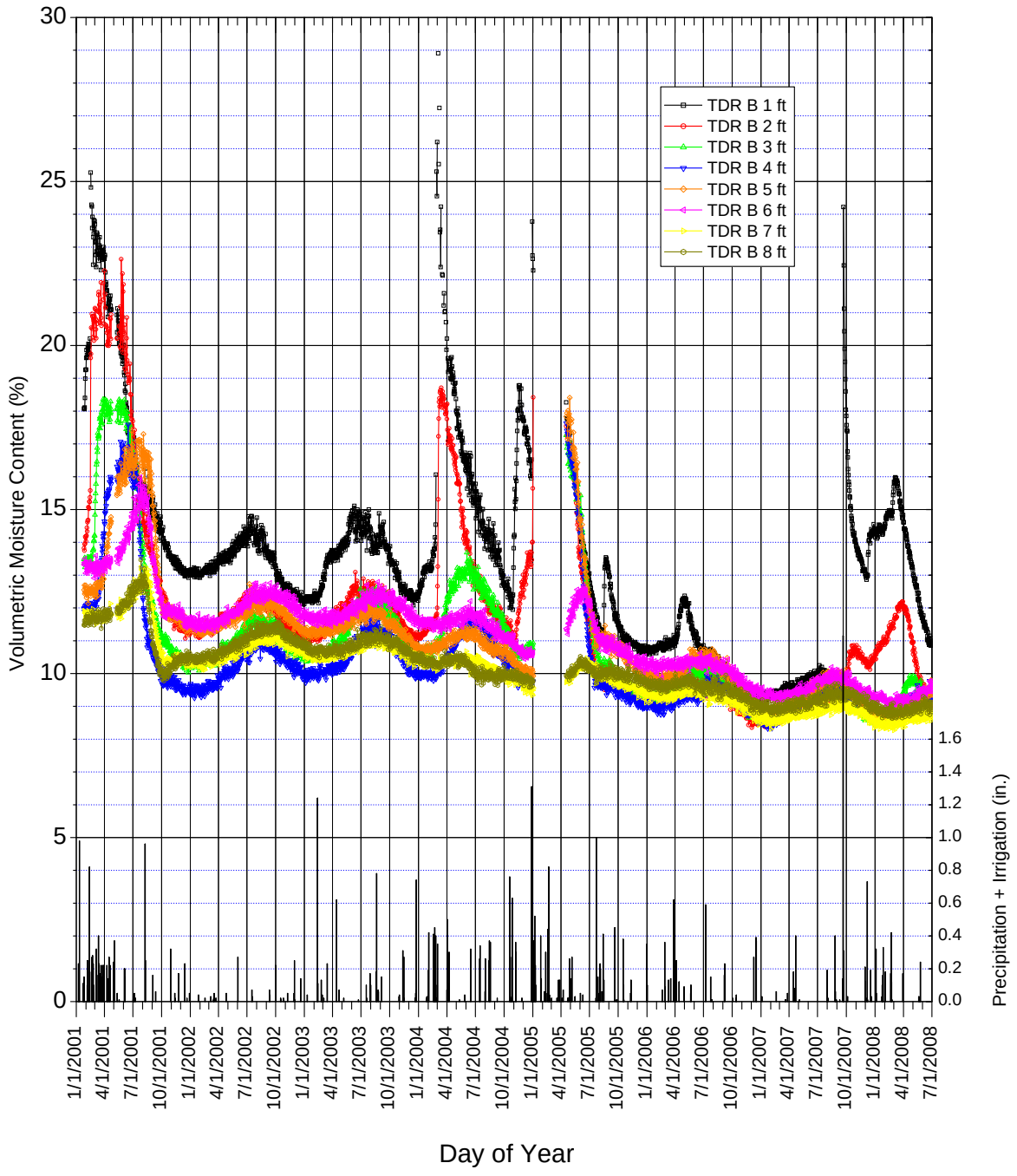

WEST TDR NEST B SOIL MOISTURE CONTENT

APPENDIX C

SUBSIDENCE SURVEY PLATS

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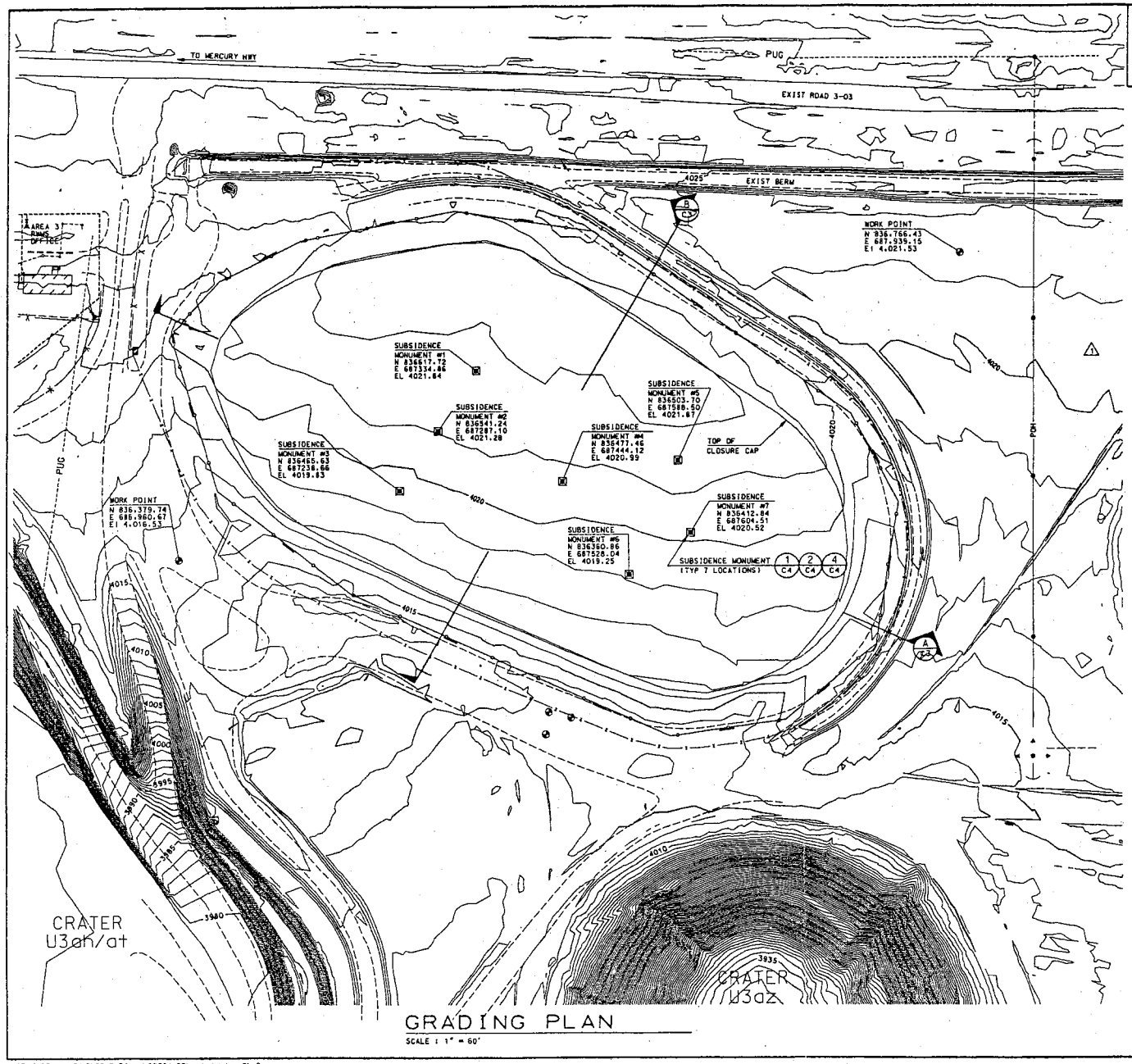

DUAL ENGLISH/METRIC DRAWING

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESIS.

WHOLE NUMBERS INDICATE MILLIMETERS
DECIMAL NUMBERS SHOWN TO TWO (2) PLACES INDICATE METERS
DECIMAL NUMBERS SHOWN TO THREE (3) PLACES INDICATE KILOMETERS

GENERAL NOTES

1. NATIVE MATERIAL SOILS WERE OBTAINED FROM THE AREA 3 BORROW PIT LOCATED 1.5 MILES (2.41 KM) SOUTH OF THE RWMS.
2. ALL SIDE SLOPES OF THE CLOSURE CAP ARE A MAXIMUM OF 10%±1%.
3. BASIS OF HORIZONTAL CONTROL IS THE NORTH AMERICAN DATUM (NAD) OF 1927, NEVADA STATE PLANE COORDINATES, CENTRAL ZONE, FEET. BASIS OF VERTICAL CONTROL IS THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1929, FEET. 1

REFERENCES

TITLE SHEET	JS-003-00004-T1
SECTIONS	JS-003-00004-C3
DETAILS	JS-003-00004-C4

ORIGINAL MYLARS SIGNED BY:

ORIGINAL AS-BUILT SIGNED BY

AS-BUILT

Bechtel Nevada — JAS for SJC — N/A — N/A

J. L. Smith for E. Campbell — 3/29/01 — JLS — 3/29/01 — N/A — N/A

N/A — N/A — N/A — N/A

UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.

GRAPHIC SCALE
0 30 60 120 180 FEET
1" = 60'

CONTOUR INTERVAL = 1 FT

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	8/7/00	INCORPORATED DRW JS-003-00004-C02.001-001, DATED 9/27/2002	JAM	
0	8/8/00	AS-BUILT, DATED 03/29/01. REVISED AND REDRAWN.	JAS	SJC
	8/8/00	ISSUED FOR CONSTRUCTION 8/8/00	JAS	SJC

DESIGNED: SUBMITTED BY/DATE: E. C. LANER 8/7/00
DRAWN: AL
CHECKED: JAS — STEVE NACHT, DEPT OF ENERGY PROJECT ENGINEER — 8/8/00
LEVEL: N/A
SURVEY REF NO: N/A
APPROVED: SIMONE CURTIS — 8/8/00
QUALITY ASSURANCE: N/A
CONTRACT NO: DE-AC08-96NV11718
DRAWING NO: JS-003-00004-C02.001-001
CI NO: CI#03388
SCALE: AS NOTED

U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE
Bechtel Nevada

NEVADA TEST SITE — AREA 03
RADIOACTIVE WASTE MANAGEMENT SITE
CAU 110 U3ox/b1 RCRA EQUIVALENT CLOSURE

GRADING PLAN

DRAWING NUMBER: JS-003-00004-C2
SHEET OF REV 2

07/16/03 04:31:27 PMG:\dgn\00004c03\cad_data\rev2\c2.dgn

APPENDIX D

VEGETATION MONITORING REPORT

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VEGETATION MONITORING
CAU 110, U-3ax/bl CLOSURE COVER
June 2008

INTRODUCTION AND BACKGROUND

A closure cover for the U-3ax/bl disposal unit in Area 3 of the Nevada Test Site (NTS) was approved and constructed in the fall of 2000. Immediately after the construction of the closure cover, actions were taken to reestablish a cover of native vegetation. The surface of the completed closure cover was ripped to about 15 centimeters (cm) (6 inches [in.]) and disked to provide a suitable seedbed. A seed mix consisting of nine native shrub species, two native grasses, and one native forb was used to seed the surface soils using a Tye drill seeder equipped with multiple drag chains. All plant species included in the seed mix are typically shallow rooted plants. Straw mulch was applied and secured using a Finn crimper. The slopes of the closure cover and the area between the cover and fence were not seeded. All revegetation activities were completed by the end of December 2000.

Natural precipitation in this region is unpredictable and meager. To minimize the effects of typical dry conditions and to maximize the potential for seed germination and plant establishment, a solid-set irrigation system consisting of a 10-cm (4-in.) pipe feeding 21 lateral lines and 207 super stand sprinklers was assembled and deployed in late December 2000. The first irrigation was in the latter part of January 2001. The area was thereafter irrigated periodically through the first week of June 2001. The combination of natural precipitation and supplemental irrigation totaled 21.6 cm (8.5 in.), which is 12.6 cm (5.0 in.) more than the 45-year average precipitation received from January to June for this area. The amount and composition of the vegetative cover on the U-3ax/bl cover has been monitored annually since the spring of 2001.

In 2005, an increase in the number of small mammals on the closure cover was noted. Because of the potential effect of small mammal burrows on the soil water holding capacity and the rate of water infiltration (Arthur and Markham, 1983; Laundre, 1989; 1993; Smith et al., 1997), action was taken to reduce the number of small mammals on the closure cover and the adjacent area between the closure cover and fence. Trapping is typically scheduled for the spring to remove pregnant animals prior to their first litter of the year. Subsequent trapping sessions may occur later in the summer and fall to remove animals that may have evaded the spring trapping or that may have migrated onto the site. Small mammal relocation efforts began in the spring of 2005 and have continued annually through the spring of 2008.

OBJECTIVES

Vegetation monitoring is conducted annually, typically during the period of peak plant production, to document the status of the vegetation on the closure cover. Any problems or issues are identified during field sampling activities. Remedial actions are recommended with the objective of maintaining a viable vegetative cover on the U-3ax/bl closure cover. The results of the small mammal trapping and relocation efforts are recorded for all trapping sessions conducted during the year, and results are provided in this report.

METHODS

Vegetation Monitoring

Each year, plant cover, density, and diversity are measured on the U-3ax/bl closure cover to evaluate the success of the revegetation efforts. This year, field sampling was completed on May 5, 2008. Five of the fifteen 100-meter (m) (328-foot [ft]) long permanent transects were randomly selected for sampling this year (transects 2, 7, 9, 10 and 13). Two of the five 50-m (164-ft) permanent transects, which are located between the closure cover and the perimeter fence and which represent a non-seeded area, were also sampled.

Plant cover was estimated using an ocular projection device that is placed at 4-m (13.1-ft) intervals along each transect. At each placement, four ocular points are projected and the type of cover (i.e., rock, bare ground, litter, mulch, or plant species) intercepted by the points is recorded. A total of 100 points are sampled per transect on the closure cover, and 50 points are sampled along transects sampled in the non-seeded area. Absolute cover is determined by dividing the number of points recorded for each cover class or species by the total number of points projected.

Plant density is estimated using a meter square (m^2) quadrat, which is placed at 5-m (16.4-ft) intervals along each transect. At each location, the number of individual plants of each species located within the boundary of the quadrat is counted and recorded. Twenty quadrats are placed along each transect located on the closure cover, and ten quadrats are placed along each transect located on the non-seeded area. Plant density estimates are averaged over all quadrats and reported as number of plants per unit area (i.e., plants per m^2).

Plant diversity, a measure of the number of different species found on a site, is determined by counting and recording the number of different plant species found within each quadrat used to sample plant density. The numbers are averaged and reported as the number of species per area (i.e., per m^2).

To assess the revegetation success of a site, comparisons are typically made to undisturbed habitat in similar vegetation types. However, there are no sites within close proximity of the U-3ax/bl closure cover that have not been disturbed. The only possible reference data are from permanent study plots that were established on the NTS in the 1960s (Webb et al., 2003) to monitor vegetation changes. One of the permanent plots is located near the U-3ax/bl closure cover in a shadscale/winterfat plant assemblage, which is similar to the type of vegetation that has established on the closure cover. This permanent study plot was visited in 2002 to be sampled, but was found to be heavily disturbed and, therefore, was not sampled. Data collected in 1963 and 1975, prior to the plot being disturbed, showed a total vegetative cover of 16.4% and 26%, respectively. The fluctuations in plant cover could have been the direct result in the amount of precipitation received during the growing season, which was 7.9 cm (3.1 in.) in 1963, well below the normal of 13.2 cm (5.2 in.), and 29.2 cm (11.5 in.) in 1975, almost twice the average.

Small Mammal Relocation

Approximately 100 small mammal traps were placed near active burrows on and around the closure cover in the spring of 2005. Another 30 traps were added during the spring 2007 trapping session. Traps are positioned each trapping session so they are in close proximity to what appears to be active burrows. A trapping session consists of three trap-nights. Traps are baited with a mix of bird seed and rolled oats and opened each trap-night. Captured animals are removed from the traps the following morning. Descriptive information is recorded on each animal, after which captured animals are transported to an area of similar habitat and at a distance beyond their home range (Howard, 1994) and released. The first trapping sessions usually occur in mid to late April and may continue until total captures during a single trap-night are 10 animals or less.

Precipitation

Based on precipitation records from 1961 to 2008, precipitation received during the growing season, which is defined as the period from September of the previous year through June of the current year, has not been favorable for plant growth since the U-3ax/bl closure cover was revegetated in 2000 (Table 1). The 47-year average amount of precipitation received during the growing season as recorded at the Buster Jangle Y (BJY) weather station, which is just north and west of the U-3ax/bl closure cover, is 13.4 cm (5.3 in.). In 2001, 10.9 cm (4.34 in.) of precipitation were received, slightly below the average. In 2002, 4.1 cm (1.6 in.) were received and, in 2003, 8.6 cm (3.4 in.) were received, for the third consecutive year of below normal precipitation. Few significant precipitation events occurred from 2001 to 2003. Storms were typically small and failed to provide sufficient moisture for either seed germination or sustained plant growth. Normal or above normal precipitation was finally experienced in 2004, with 14.7 cm (5.8 in.), followed by 25.4 cm (10.0 in.) in 2005. Good growing conditions were short lived as 2006 and 2007 experienced below normal precipitation.

Although precipitation for the 2008 growing season is above normal, it has been spread out over the last eight months. About half of the total precipitation was received last September. Then about 2.5 cm (1 in.) was received in December, January, and February. Since February, less than 0.5 cm (0.2 in.) of rain has fallen.

Table 1. Precipitation received at BJY weather station on the NTS (National Oceanic and Atmospheric Administration, 2008).

	47-Year Average	2000	2001	2002	2003	2004	2005	2006	2007	2008
Calendar Year	**16.8 (6.63)**	**16.8 (6.6)**	**15.5 (6.1)**	**3.8 (1.5)**	**14.6 (5.8)**	**26.5 (10.4)**	**23.3 (9.2)**	**11.0 (4.3)**	**14.3 (5.6)**	**5.5 (2.2)**
Growing Season*	**13.4 (5.3)**	**15.3 (6.0)**	**11.0 (4.3)**	**4.1 (1.6)**	**8.7 (3.4)**	**14.8 (5.8)**	**25.4 (10.0)**	**10.2 (4.0)**	**4.4 (1.7)**	**15.8 (6.2)**

*** Precipitation from September of previous year through June of current year in centimeters (inches).**

RESULTS

Vegetation Monitoring Closure Cover

Plant Cover – The amount of plant cover on the U-3ax/bl closure cover has been measured by species since 2003. Prior to 2003 plant cover was only estimated by life form. Typically plant cover on newly revegetated sites is not sampled in arid regions, such as is typical of the NTS, until about the fifth year after revegetation. In the instance of the U-3ax/bl closure cover, plant cover was high even after the first growing season. This is due primarily to the use of supplemental irrigation. Plant cover data for the U-3ax/bl closure cover for the last five years are reported in Table 2. Cover data prior to this period are available in previous reports.

Table 2. Average percentage cover on seeded areas on CAU 110, U-3ax/bl closure cover.

Perennials	2004	2005	2006	2007	2008
Shadscale**	8.6	15.4	18.0	10.6	12.2
Nevada Ephedra	0.4	0.8	1.2	0.0	0.4
Winterfat	0.6	0.4	0.4	0.0	0.2
Total	9.6	16.8	19.6	10.6	12.8
Annuals					
Buckwheat	0.2	1.2	0.0	0.0	5.0
Steve's pincushion	0.0	0.0	0.0	0.0	2.8
Tumblemustard	0.0	0.0	0.0	0.0	4.4
Halogeton	0.0	0.0	0.0	0.0	0.0
Russian thistle	3.0	1.2	0.0	0.0	0.0
Other annual forbs	0.0	0.8	0.0	0.0	0.6
Cheatgrass	0.0	0.2	0.0	0.0	1.2
Total	3.2	3.4	0.0	0.0	14.0
Total Plant Cover	12.8	20.2	19.6	10.6	26.8
Bare Ground/Rock	72.6	53.6	57.2	63.6	61.4
Litter/Mulch	14.6	26.2	23.2	25.8	11.8

In 2008, total plant cover, including perennial and annual plant species, was the highest it has ever been on the U-3ax/bl closure cover. Perennial plant cover was higher than last year but still less than 2005 and 2006. All of the perennial plant cover is from shrubs. To date, perennial grasses have not contributed to overall plant cover on the closure cover. Annual plant cover was more than four times higher this year than it was in 2004 and 2005, the last years when there was any annual plant cover on the closure cover.

The increase in total plant cover this year is the result of an increase in the abundance of annual plants. Shrub cover increased slightly over last year, but still not the four-fold increase experienced with annual plants. Shrub cover this year is slightly less than the five-year average of 13.9%. Annual forbs and annual grasses have only contributed to overall plant cover three of the last five years.

Shadscale remains the most abundant plant on the closure cover. This perennial shrub, along with Nevada jointfir and winterfat, has persisted from year to year on the closure cover. The amount of cover contributed by these species is usually related to the amount of precipitation received that particular year. Neither Nevada jointfir nor winterfat contributed to total plant cover last year. However, both shrubs showed an increase in cover. This year's 0.4% Nevada jointfir cover and 0.2% winterfat cover are less than the five year averages for these species; however, the plants show signs of recovery after the below normal precipitation in recent years.

The dominant annual plant species seems to vary from year to year (Table 2). Steve's pincushion, an annual forb, had the highest cover of all annual plants this year. This was the first year tumblemustard was encountered on the closure cover. Prickly Russian thistle has occurred in previous years, but did not contribute to overall annual plant cover this year. This plant species germinates and grows later in the year, typically in June and July, and may increase in abundance later. Of particular note for the annual species is the rather significant increase in cheatgrass. This is an introduced, weedy plant species which dominates much of the rangelands in the western United States. In 2005, the only other time this species contributed to overall plant cover, it made up less than 1% of the total cover. This year, it made up about 4.5% of the total cover.

Although an increase in cheatgrass cover was noted this year, overall noxious weeds have declined. In 2004, noxious weeds made up about 23% of the total cover, whereas they made up 7% in 2005 and 4.5% in 2008, indicating a downward trend in the amount of cover from noxious weeds.

The other difference between the U-3ax/bl closure cover and the ecological monitoring plot is in the amount of perennial grasses. To date, grasses have not contributed to plant cover on the closure cover (Table 2 and Figure 1). On the ecological monitoring plot, grasses made up less than 1% in 1963, but increased to 2.5% in 1973 (Webb et al., 2003). Grasses contribute a small amount to overall plant cover in this vegetation type; however, it should be more than is currently measured on the closure cover. Indian ricegrass and squirreltail grass are present on the closure cover and, with time and more favorable growing conditions, may contribute more to total plant cover in the future.

Overall plant cover this year on the U-3ax/bl closure cover was 26.8%, which is slightly higher than was historically recorded on ecological monitoring plots in shadscale/winterfat plant assemblage (Webb et al., 2003). The data collected at the ecological monitoring plot serve as a standard, or reference, for the vigor of the vegetation on the U-3ax/bl closure cover and how well the vegetation has reestablished on the closure cover since it was constructed in the fall of 2000.

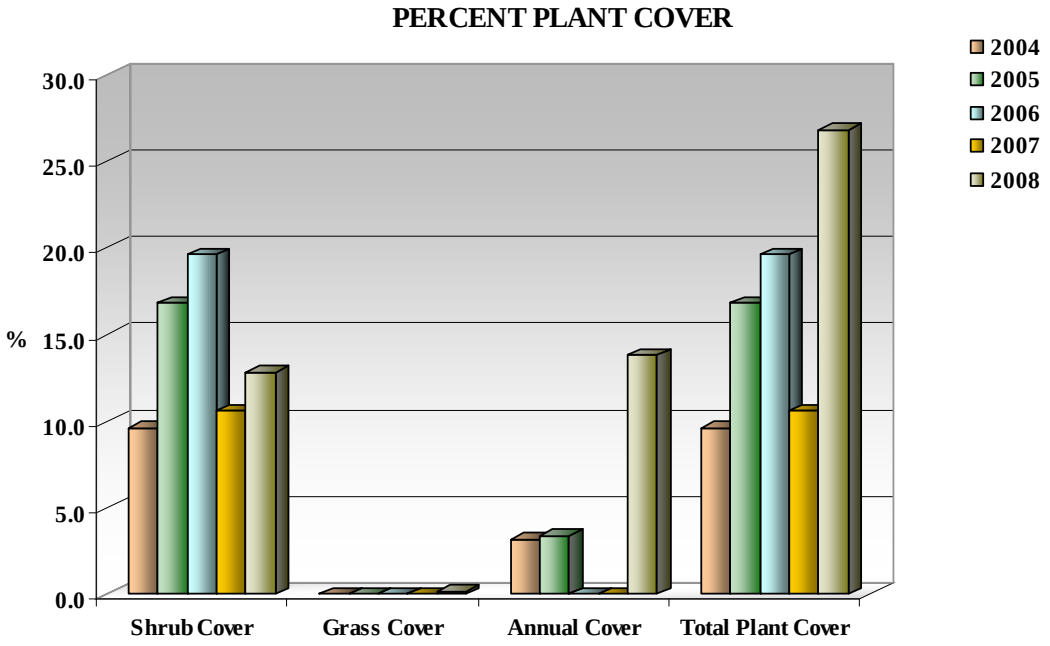

Figure 1. Percent Plant Cover on U-3ax/bl closure cover from 2004 to 2008.

Plant Density – Overall plant density increased dramatically this year from the last two years; however, this is the third consecutive year that perennial plant density has decreased. Shrub density declined from 2.0 shrubs/m^2 (0.2 shrubs/ft^2) in 2007 to 1.7 shrubs/m^2 (0.2 shrubs/ft^2) this year (Table 3). The decrease in shrub density this year was not as large as the decrease experienced from 2006 to 2007, when there was more than a 40% decrease in shrub density. Shrub density is about two-thirds of what it was in 2005 (Figure 2). Grass density has never been as high as shrub density, but grass density for the last two years has been zero. The density of annual forbs was the highest it has been for the last three years, but still only about half the density experienced in 2004 and 2006 (Table 3).

Table 3. Plant Density on U-3ax/bl closure cover

Shrubs	2004	2005	2006	2007	2008
Buckwheat	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Budsage	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Burrobush	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Desert Thorn	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nevada Ephedra	1.5 (0.1)	1.8 (0.2)	1.3 (0.1)	0.4 (0.04)	0.3 (0.03)
Rubber Rabbitbrush	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Shadscale	2.3 (0.2)	2.5 (0.2)	1.9 (0.2)	1.4 (0.1)	1.1 (0.1)
Spiny Hopsage	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Winterfat	0.7 (0.1)	0.4 (0.04)	0.3 (0.03)	0.2 (0.02)	0.01 (0.001)
Grasses					
Indian Ricegrass	0.4 (0.04)	0.3 (0.03)	0.1 (0.01)	0.0 (0.0)	0.0 (0.0)
Squirreltail	0.0 (0.0)	0.1 (0.01)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Annual grasses	0.5 (0.05)	1.9 (0.2)	1.2 (0.1)	0.0 (0.0)	2.4 (0.2)
Forbs					
Globemallow	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.03 (0.003)
Flatcrown Buckwheat	7.8 (0.7)	13.7 (1.3)	0.2 (0.02)	0.0 (0.0)	26.6 (2.5)
Halogeton	3.9 (0.4)	12.5 (1.2)	0.0 (0.0)	0.0 (0.0)	0.2 (0.02)
Russian Thistle	77.0 (7.2)	70.3 (6.5)	3.2 (0.3)	0.0 (0.0)	0.1 (0.001)
Steve's Pincushion	0.0 (0.0)	0.1 (0.001)	0.0 (0.0)	0.0 (0.0)	8.3 (0.8)
Tumblemustard	0.0 (0.0)	0.1 (0.001)	0.0 (0.0)	0.0 (0.0)	3.8 (0.4)
Other annual forbs	0.4 (0.04)	1.9 (0.2)	0.1 (0.001)	0.0 (0.0)	0.0 (0.0)
Shrubs	4.5 (0.4)	4.7 (0.4)	3.5 (0.3)	2.0 (0.2)	1.7 (0.2)
Grasses	0.4 (0.04)	0.4 (0.04)	0.1 (0.001)	0.0 (0.0)	0.0 (0.0)
Annual Grasses	0.5 (0.05)	1.9 (0.2)	1.2 (0.1)	0.0 (0.0)	2.4 (0.2)
Annual Forbs	89.1 (8.3)	98.5 (9.5)	3.5 (0.3)	0.0 (0.0)	41.1 (3.8)
Total Plant Density	94.5 (8.8)	105.6 (9.8)	8.3 (0.8)	2.0 (0.2)	45.2 (4.2)
Noxious Weeds (included in annual grasses and forbs)	81.4 (7.6)	84.6 (7.9)	4.4 (0.4)	0.0 (0.0)	2.6 (0.2)

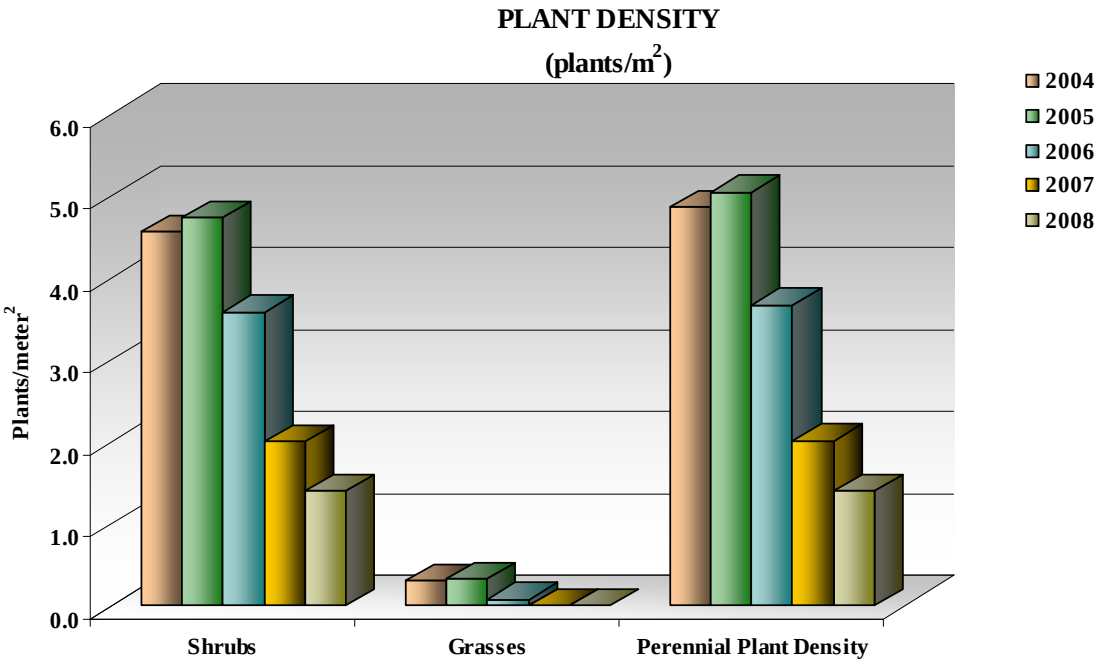

Figure 2. Plant Density on U-3ax/bl closure cover from 2004 to 2008.

Figure 3. Nevada ephedra (foreground) and shadscale (background) in full bloom.

Shadscale, Nevada ephedra, and winterfat are the only three shrub species found on the closure cover. The first few years after revegetation, there were as many as eleven different shrub species present. All three of the species experienced a decline this last year. Although the density of these three species has declined, their vigor remains high. Shadscale plants, just like in previous years, flowered and were setting seed, as was Nevada ephedra (Figure 3). The few plants of winterfat observed on the closure cover this year were robust and had flowered and were in early seed set (Figure 4). Of the three shrubs found on the closure cover, winterfat is the most palatable for native browsing animals. It was noted last year that winterfat had been under intensive browsing pressure. Animals had burrowed into its roots, which resulted in the death of many winterfat plants. The density for shadscale continues to be the highest of the three shrubs, although density has declined from about 2 plants/m^2 (0.2 plants/ft^2) in 2004 and 2005 to about 1 plant/m^2 (0.1 plant/ft^2) in 2008 (Table 3). As mentioned in previous years, the density of shadscale the first couple years after revegetation was more than 10 plants/m^2 (0.9 plants/ft^2). Plant density decreased sharply the next few years and has reached equilibrium with available resources.

Figure 4. Winterfat in flower on U-3ax/bl closure

Fourwing saltbush has been occasionally found on the closure cover over the years. It was not seeded as part of the revegetation program but has established naturally. This past year all fourwing saltbush plants were removed from the closure cover. The deeper rooting system of fourwing saltbush posed a risk of penetrating the buried waste and compromising the integrity of the closure cover.

Two perennial grasses, Indian ricegrass and squirreltail, were commonly found on the closure cover until a couple of years ago. The density of these two species dropped from 0.4 plants/m^2 (0.04 plants/ft^2) in 2004 and 2005 to about 0.1 plants/m^2 (0.001 plants/ft^2) in 2006. Neither species has been found on the closure cover the last two years (Table 3). A few individuals of these species were infrequently observed on the closure cover this year, suggesting that with more favorable growing conditions, density of these species may increase.

The increase in overall plant density this year is a direct result of the increase in the density of annual forbs and annual grasses. There were a few annual plants on the closure cover in 2006, but there were no annual plants in 2007. The 41.1 annual forbs/m^2 (3.8 annual forbs/ft^2) was an increase over the previous two years, yet it was only about half of the forb densities experienced in 2004 and 2005 (Table 3). This year there was a mix of native annual forbs, whereas in previous years, prickly Russian thistle made up almost three-fourths of total annual density. This year flatcrown buckwheat, Steve's pincushion, and tumblemustard were the three most abundant annual forbs on the closure cover (Figure 5). These three forbs accounted for almost 95% of the total annual plant density (Table 3). The density for all three species was higher this year than any other year since the site was revegetated in the fall of 2000. These three species were more abundant and contributed to both plant density and cover (Tables 2 and 3).

Figure 5. Flatcrown buckwheat with round silvery-green leaves, Steve's pincushion with white flower, and yellow-flowered smooth desert dandelion are common annual native forbs on U-3ax/bl closure cover.

Over the last five years the density of annual grasses has ranged from 0 in 2007 to a high of 2.4 plants/m^2 (0.2 plants/ft^2) this year. Of the three annual grasses found on the closure cover, cheatgrass is the most abundant.

A concern on most newly revegetated sites is the invasion of non-native or noxious plant species. These noxious weeds quickly invade a newly disturbed site and use up the limited supplies of water and nutrients, leaving the slower establishing native species at a disadvantage. This was the situation on the U-3ax/bl closure cover. Cheatgrass, redbrome, Arabian schismus, all non-native annual grasses, along with halogeton and prickly Russian thistle, non-native forbs, made up from 50% to 80% of the total plant density between 2004 and 2006. This year, non-native species only accounted for 6% of the total plant density. It appears that the native species have become established, and both native perennial and annual species are able to compete with the aggressive noxious weeds for the limited natural resources.

Plant Diversity – Plant diversity, as measured by the number of different plant species present at a site, has varied over the past eight years from a high of 19 in 2006 to a low of 5 last year. The most marked decline over the past eight years has been the decline in perennial plant species. There were as many as 13 different perennial species on the site the first couple of years after revegetation. However, over time, the number has declined to just three perennial species this year. All three species are shrubs: shadscale, winterfat, and Nevada ephedra (Table 4). Fourwing saltbush has been present on the site for the last several years but it was removed as was previously described. The continued dry conditions experienced at the U-3ax/bl site appear to have the greatest effect on perennial grasses. Over the years, Indian ricegrass and squirreltail grass were present on the site. Indian ricegrass persisted up until last year when, for the first time, no perennial grasses were present.

Table 4. Plant diversity on U-3ax/bl cover.

Lifeform	2001	2002	2003	2004	2005	2006	2007	2008
Shrubs	10	7	4	4	5	5	4	3
Grasses	2	2	1	1	2	1	1	0
Annual grasses	0	0	1	1	3	2	0	3
Annual forbs	1	0	5	4	9	8	0	11
Total Number of Species	13	9	11	10	19	16	5	17
Noxious species	0	0	3	2	4	4	0	5

Annual forb diversity varies with the pattern and amount of annual precipitation. The precipitation pattern this year favored several native annual forbs, as is noted by the all-time high of 11 different annual forbs. In addition to the 11 different annual forb species, there were three annual grass species encountered this year. All three annual grasses, along with halogeton and prickly Russian thistle, are non-native species. This is the first year that all five noxious weeds, previously known to occur on the U-3ax/bl closure cover, have been encountered in the same year. Usually the number of noxious weed species makes up about 20% of the total number of species; however, this year, noxious weeds make up about 30% of the total plant diversity.

Vegetation Monitoring Periphery

Cover – As in previous years there are no perennial plants growing on the periphery of the closure cover; therefore, there is no perennial plant cover or density. This is the first year since 2005 that there has been any plant cover on the periphery (Figure 6). Total plant cover on the periphery was actually higher than on the closure cover (Tables 2 and 5). Within a few weeks or months, plant cover on the peripheral areas will be reduced to dead plant material or litter, whereas on the closure cover, the majority of the plant cover will persist throughout the year.

Figure 6. Overview of vegetative cover of primarily tumblemustard on periphery of U-3ax/bl closure cover.

Table 5. Average percentage cover on unseeded areas on CAU 110, U-3ax/bl closure cover.

Annuals	2005	2006	2007	2008
Flatcrown buckwheat	4.0	0.0	0.0	8.1
Steve's pincushion	0.0	0.0	0.0	5.1
Tumblemustard	1.0	0.0	0.0	8.1
Halogeton	6.0	0.0	0.0	0.0
Prickly Russian thistle	12.0	0.0	0.0	0.0
Other annual forbs	0.0	0.0	0.0	1.0
Cheatgrass	0.0	0.0	0.0	5.1
Total Plant Cover	23.0	0.0	0.0	27.4
Bare Ground/Rock	66.0	58.7	58.7	65.5
Litter/Mulch	11.0	41.3	41.3	7.1

The main species contributing to the overall plant cover are the same species found on the closure cover and include flatcrown buckwheat, Steve's pincushion, and tumblemustard (Figure 5). These three species make up more than three-fourths of the total plant cover on the periphery. The only other species that added significantly to over plant cover was cheatgrass, which made up about 20% of total cover. This is the first year that cheatgrass has contributed to overall plant cover.

Density – Plant density on the periphery increased from 3.4 plants/m^2 (0.3 plants/ft^2) in 2006 and zero in 2007. All 76.4 plants/m^2 (7.1 plants/ft^2) on the periphery, just like in 2005 and 2006, are annual forbs or grasses (Table 6). This year 10% are grasses and 90% are forbs. The most abundant forbs on the periphery are flatcrown buckwheat, which makes up 56% of the plant density; Steve's pincushion 9%; and tumblemustard 12%. In comparison, flatcrown buckwheat makes up 59% of plant density on the closure cover, Steve's pincushion 18%, and tumblemustard 8%.

Table 6. Average plant density on the periphery of the CAU 110, U-3ax/bl closure cover.

Annual Grasses	2005	2006	2007	2008
Cheatgrass	0.5 (0.05)	0.03 (0.003)	0.0 (0.0)	7.2 (0.7)
Annual Forbs				
Globemallow	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Flatcrown buckwheat	7.8 (0.7)	0.0 (0.0)	0.0 (0.0)	43.0 (4.0)
Steve's pincushion	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	6.5 (0.6)
Tumblemustard	0.0 (0.0)	0.07 (0.007)	0.0 (0.0)	9.2 (0.9)
Halogeton	3.9 (0.4)	0.0 (0.0)	0.0 (0.0)	0.3 (0.03)
Prickly Russian thistle	77.0 (7.2)	3.4 (0.3)	0.0 (0.0)	7.5 (0.7)
Other annual forbs	0.4 (0.04)	0.0 (0.0)	0.0 (0.0)	3.9 (0.4)
Summary				
Annual Grasses	0.5 (0.05)	0.03 (0.003)	0.0 (0.0)	7.2 (0.7)
Annual Forbs	89.1 (8.3)	3.4 (0.3)	0.0 (0.0)	69.3 (6.4)
Total Plant Density	89.6 (8.3)	3.5 (0.3)	0.0 (0.0)	76.4 (7.1)
Noxious Weeds	71.4 (6.6)	3.4 (0.3)	0.0 (0.0)	15.0 (1.4)

Cheatgrass is the only annual grass found on the periphery. Its density is higher on the periphery than it is on the closure cover. In previous years, cheatgrass made up less than 1% of total plant density, or about 1 plant/m^2 (0.1 plant/ft^2), but this year there were 7.2 plants/m^2 (0.7 plants/ft^2) or about 10% of total plant density. There were 2.4 plants/m^2 (0.2 plants/ft^2) on the closure cover, or 5% of total plant density.

Noxious weeds are always a concern because they can quickly dominate a site and prevent establishment of native plant species. Noxious weeds make up about 20% of the total plant density on the periphery, compared with 6% on the closure cover. The density of noxious weeds on the closure cover is 2.6 plants/m^2 (0.2 plants/ft^2) with 2.4 plants/m^2 (0.2 plants/ft^2) of cheatgrass. In comparison there are 15.0 noxious weeds/m^2 (1.4 noxious weeds/ft^2) on the periphery, about half are cheatgrass and the other half prickly Russian thistle. Halogeton contributes less than 1.0 plant/m^2 (0.1 plants/ft^2).

Diversity – The number of different species of annual plants on the periphery of the closure cover is more than double what it has been in past years (Table 7). There are 10 different species of forbs and 1 annual grass. Three of the species, one grass and two forbs, are noxious weeds, which account for about 30% of all species. In past years the percentage has been 40% and 67%. No perennial plants have become established on the periphery.

Table 7. Plant diversity on unseeded areas on U-3ax/bl cover.

Lifeform	2005	2006	2007	2008
Shrubs	0	0	0	0
Grasses	0	0	0	0
Annual grasses	1	1	0	1
Annual forbs	4	2	0	10
Total Number of Species	5	3	0	11
Noxious species	2	2	0	3

Small Mammal Trapping and Relocation

Since the spring of 2005, 694 animals have been removed from the CAU 110, U-3ax/bl closure cover area (Table 8). This year, only 13 animals were captured and removed during a single three-night trapping session. This is the fewest number of animals captured during a single session. All were kangaroo rats: three were captured on the closure cover and the other ten along the periphery of the closure cover.

Over the last four years there have been a nearly equal number of animals removed from the closure cover as from the periphery (the area between the closure cover and the fence). Kangaroo rats, primarily Merriam's with some chisel-toothed, are the most common group of small mammals captured. Over all sessions, 409 kangaroo rats (59% of all captures), 272 deer mice (39% of all captures), 10 white-tailed antelope squirrel, 2 long-tailed pocketmice, and 1 southern grasshopper mouse (the last three categories make up 2% of all captures) have been captured and relocated (Table 8).

Table 8. Summary of relocation of small mammals from the U-3ax/bl closure cover over the last four years.

	2005	2006	2007	2008	Total Captured & Relocated to Date
Merriam's Kangaroo Rat*	135	198	33	10	376
Chisel-toothed Kangaroo Rat*	3	23	4	3	33
Deer Mouse*	46	226	0	0	272
Other Small Mammals	2	2	9	0	13
Total Captures	186	449	46	13	694
Precipitation Received during Previous Growing Season (Inches)	14.8 cm (5.8 in.)	25.4 cm (10.0 in.)	10.2 cm (4.0 in.)	4.4 cm (1.7 in.)	

***See Attachment 1 for list of scientific names and associated common names for small mammals.**

The fluctuation in the number of small mammals present on the U-3ax/bl closure cover appears to be closely related to the amount of precipitation received during the previous plant growing season (Table 1 and Table 8). The last two years, small mammal captures have been well below the numbers experienced in 2005 and 2006. Growing season precipitation for 2006 and 2007, the two years preceding trapping efforts in 2007 and 2008, was below normal. Growing season precipitation for 2004 and 2005 was above normal, especially in 2005, and small mammal

captures the following years were correspondingly higher. This information may be useful in predicting when more intensive trapping efforts may be required in future years.

SUMMARY

Perennial plant cover fluctuates from year to year with no apparent trend (Figure 1). The amount of perennial plant cover appears to be related to the timing and amount of annual precipitation. Several good precipitation events occurred early in the growing season this year and continued through February. However, since February, only insignificant amounts of precipitation have been received (Table 1). This pattern seems to favor certain annual species, such as flatcrown buckwheat and Steve's pincushion. Perennial plant growth, as indicated by perennial cover, was higher than last year but still less than what was measured in 2005 and 2006. Similar fluctuations are expected in future years as established perennial species, essentially shrubs, continue to respond to different precipitation patterns. Perennial grasses are present on the site, but growing conditions over the past several years have not favored their growth. Perennial grasses may come back onto the U-3ax/bl closure cover when precipitation patterns and amounts are more conducive to their growth requirements.

Perennial plant density on the closure cover does not fluctuate from year to year like plant cover. Perennial plant density shows a gradual decline over the years (Figure 2). Plant densities were originally high, but have declined as plants grow larger and demand for the limited resources (water and nutrients) increases, creating a natural thinning process. Harsh growing conditions are typical for this region, and observations of native plant communities have indicated similar declines in plant density and diversity over the last few years. Overall perennial plant densities have declined on revegetation sites monitored annually on the Tonopah Test Range, which is further north in the Great Basin ecoregion yet in a similar shrub/grassland plant community. Although the 1.7 plants/m^2 (0.2 plants/ft^2) (Table 3) is the lowest plant density recorded to date on the U-3ax/bl closure cover, perennial species on the closure cover appear to be well established. Shrubs are flowering, setting seed, and suggest an overall stable native plant community (Figures 7–14). Heavy browsing and tunneling into the roots of shrubs was not observed this year as in previous years.

The loss of perennial grasses has been a concern for several years. Over time, with some good growing seasons, they may return to the site. Any remedial revegetation would involve a major effort to establish perennial grasses on the site. Seeding could be used, but it would be labor intensive and the results marginal unless followed with above normal precipitation or irrigation. Currently, the vegetation on the closure cover is stable and the plants that are there are well established. This meets the primary objectives of the vegetative cover.

Annual plants were more abundant this year, both in contributions to plant cover as well as plant density, than any other year. Typically in the past, weedy species made up the majority of annual plant cover and density. However, this year the majority of the annual forbs were species native to the area. Although there was an increase in the amount of cheatgrass on the closure cover this year, for the most part the closure cover could be characterized as a native plant community. In previous years both halogeton and prickly Russian thistle, two noxious weeds, were found on the closure cover. Based on plant density and cover for these species this year, they were insignificantly present.

Small mammal activity on the closure cover is the lowest it has been since trapping and relocation began in 2005. As mentioned in previous years, keeping small mammals off the closure cover would require a major effort. However, almost half of the animals captured to date have been from the periphery of the closure cover. This area is typically characterized by mounds of dead plant material, primarily prickly Russian thistle, which provides good cover for small mammal activity. Removing the prickly Russian thistle from the perimeter of the closure cover would (1) reduce the possibility that animals would inhabit these areas because it would be too open and exposed, (2) expose small mammals that are there to natural predators, and (3) eliminate islands of protection and increase the distance an animal is exposed when moving onto the site from adjacent habitats.

Figure 7. CAU 110, U-3ax/bl closure cover June 2002, looking southeast from center of cover.

Figure 8. CAU 110, U-3ax/bl closure cover June 2005, looking southeast from center of cover.

Figure 9. CAU 110, U-3ax/bl closure cover May 2007, looking southeast from center of cover.

Figure 10. CAU 110, U-3ax/bl closure cover May 2008, looking southeast from center of cover.

Figure 11. CAU 110, U-3ax/bl closure cover June 2005, looking southeast from center of cover.

Figure 12. CAU 110, U-3ax/bl closure cover May 2006, looking southeast from center of cover.

Figure 13. CAU 110, U-3ax/bl closure cover May 2007, looking southeast from center of cover.

Figure 14. CAU 110, U3axbl closure cover May 2008, looking southeast from center of cover.

References

Arthur, W. J. and O. D. Markham. 1983. "Small Mammal Soil Burrowing as a Radionuclide Transport Vector at a Radioactive Waste Disposal Area in Southeastern Idaho." *Journal of Environmental Quality*, Vol. 12, No. 1, pp. 117–122.

Howard, V. W., Jr. 1994. "Kangaroo Rats." In: S. E. Hygnstrom and R. M. Timm, eds. *Prevention and Control of Wildlife Damage*. University of Nebraska-Lincoln. pp. B-101–B-104.

Laundre, J. W. 1993. "Effects of Small Mammal Burrows on Water Infiltration in a Cool Desert Environment." *Oecologia* vol. 94, No. 1, pp. 43–48.

Laundre, J. W. 1989. "Horizontal and Vertical Diameter of Burros of Five Small Mammal Species in Southeastern Idaho." *Great Basin Naturalist*. Vol. 49, No. 4, pp. 646–649.

National Oceanic and Atmospheric Administration. 2008.

Smith, E. D., R. J. Luxmoore, and G. W. Suter, II. 1997. "Natural Physical and Biological Processes Compromise the Long-Term Performance of Compacted Soil Caps." In: *Barrier Technologies for Environmental Management*. Washington, D.C. National Academy Press. pp. D-61–6-70.

Webb, R. H., M. B. Murov, T. C. Esque, D. E. Boyer, L. A. DeFalco, D. F.Haines, D. Oldershaw, S. J. Scoles, K. A. Thomas, J. B. Blainey, and P. A. Medica. 2003. *Perennial Vegetation Data from Permanent Plots on the Nevada Test Site, Nye County, Nevada*. U.S. Geological Survey Open-File Report 03-336. Tucson, AZ.

ATTACHMENT 1
Scientific and common names
of plant species seeded or encountered on
CAU 110, U-3ax/bl closure cover

PLANTS

	Scientific Name	Common Name
PERENNIALS		
SHRUBS	*Picrothamnus desertorum*	Bud sagebrush
	Atriplex canescens	Fourwing saltbush
	Atriplex confertifolia	Shadscale
	Ephedra nevadensis	Nevada ephedra
	Ericameria nauseosa	Rubber rabbitbrush
	Eriognum fasciculatum	Eastern Mohave buckwheat
	Grayia spinosa	Spiny hopsage
	Krascheninnikovia lanata	Winterfat
GRASSES	*Achnatherum hymenoides*	Indian ricegrass
	Elymus elymoides	Squirreltail
FORBS	*Sphaeralcea ambigua*	Globemallow
ANNUALS		
GRASSES	*Bromus tectorum*	Cheatgrass
	Bromus rubens	Red brome
	Schimus arabicus	Arabian schismus
FORBS	*Amsinckia tessellata*	Bristly fiddleneck
	Chaenactis stevioides	Steve's pincushion
	Cryptantha circumssium	Red stem cryptantha
	Cryptantha nevadensis	Nevada cateyes
	Descurania pinnata	Pinnate tansymustard
	Eriogonum deflexum	Flatcrown buckwheat
	Eriogonum maculatum	Spotted buckwheat
	Eriogonum nidularium	Birdnest buckwheat
	Halogeton glomerata	Halogeton
	Malacothrix glabrata	Smooth desert dandelion
	Mentzelia albomarginatus	Blazingstar
	Salsola iberica	Prickly Russian thistle
	Sisymbrium altissimum	Tumblemustard

ANIMALS

Dipidomys merriami	Merriam's kangaroo rat
Dipidomys microps	Chisel-toothed kangaroo rat
Peromyscus maniculatus	Deer mouse
Onychomys torridus	Southern grasshopper mouse
Chaetodipus formosus	Long-tailed pocket mouse
Ammospermophilus leucurus	White-tailed antelope squirrel

APPENDIX E

PRECIPITATION RECORDS

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NTS PRECIPITATION

July 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11				T					0.02						0.01		0.05
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23	0.02				0.01								0.01				
24						0.01		0.01							0.02	0.01	
25																	
26																	
27						0.04							0.01				
28	0.05							0.02									
29																	
30															0.01		0.02
31	0.12	0.05	0.02		0.07	0.20		0.01		0.03	0.02	0.02		0.06	0.10		0.04
TOTAL	0.19	0.05	0.02	0.00	0.08	0.25	0.00	0.04	0.02	0.03	0.02	0.02	0.02	0.06	0.14	0.01	0.11

Area 12 Dip Stick Rain Gage Reading: 0.60 inches of precipitation from 07/06/2007 to 08/01/2007

Data Tabulated By: /s/ Raymond Dennis 08/06/07

Data Quality Control: see original 08/07/07

Certified By: /s/ Kip Smith 8/7/2007

NTS PRECIPITATION

August 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1	0.37	0.19	0.32	0.16	0.19	0.45	0.07	0.37	0.21	0.28	0.40	0.28	0.12	0.02	0.36	0.22	0.19
2	0.03		0.11	0.02	0.10	0.02	0.02		0.23	0.17	0.11			0.13	0.48	0.17	0.03
3		0.02			0.01						0.01					0.02	
4																	
5																	
6																	
7																	
8																	
9																	
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18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26	0.13	0.40	0.75	0.25	0.25	0.06		0.04	0.20	0.65		0.34	0.08	0.02	0.43	0.10	0.03
27	2.16	0.06	0.08	0.04	0.03	0.75	1.15	0.04	0.04	0.48	0.04	0.22		0.06	0.09		0.23
28	0.37					0.11		0.35		0.01	0.67	0.20			0.01		
29								0.01									
30	0.03	0.01		0.04	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.04	0.01	0.01	0.02	0.02	
31																	
TOTAL	3.09	0.68	1.26	0.51	0.59	1.41	1.25	0.83	0.69	1.61	1.24	1.08	0.21	0.24	1.39	0.53	0.48

Area 12 Dip Stick Rain Gage Reading: 1.30 inches of precipitation from 08/01/2007 to 08/31/2007

Data Tabulated By: /s/ Raymond Dennis 09/05/07

Data Quality Control: /s/ J Wood 09/06/07

Certified By: /s/ Kip Smith 9/7/2007

NTS PRECIPITATION

September 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10	0.01	0.01						0.10	0.02	0.02	0.01			0.01	0.02	0.01	0.02
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20	0.11	0.14			0.13	0.05		0.01		0.06	0.01	0.01	0.13		0.07	0.05	
21	2.92	2.23	2.46	1.86	2.10	2.46	3.70	2.84	2.08	2.50	3.26	3.05	2.52	3.77	2.79	2.02	2.25
22	0.18	0.31	0.12	0.54	0.10	0.19	0.98	0.02	0.05	0.29	0.45	0.42	0.37	0.16	0.31	0.30	0.38
23		0.04															0.04
24																	
25																	
26																	
27																	
28																	
29																	
30																	
TOTAL	3.22	2.73	2.58	2.40	2.33	2.70	4.68	2.97	2.15	2.87	3.73	3.48	3.02	3.94	3.19	2.38	2.69

Area 12 Dip Stick Rain Gage Reading: 2.90 inches of precipitation from 08/31/2007 to 10/01/2007

Data Tabulated By: /s/ Raymond Dennis 10/03/07

Data Quality Control: see original 10/03/07

Certified By: /s/ Kip Smith 10/3/2007

NTS PRECIPITATION

October 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5	0.01	0.03				0.02		0.03		0.01	0.02	0.03			0.01		
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.01	0.03	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.01	0.02	0.03	0.00	0.00	0.01	0.00	0.00

Area 12 Dip Stick Rain Gage Reading: 0.00 inches of precipitation from 10/01/2007 to 11/02/2007

Data Tabulated By: /s/ Raymond Dennis 11/07/2007

Data Quality Control: /s/ J Wood 11/07/07

Certified By: /s/ Kip Smith 11/7/2007

NTS PRECIPITATION

November 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11												0.07					
12																	
13												0.02					
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30	0.23	0.21	0.28	0.25	0.17	0.24	0.19	0.18	0.17	0.43	0.09	0.01	0.29	0.14	0.19	0.12	0.12
TOTAL	0.23	0.21	0.28	0.25	0.17	0.24	0.19	0.18	0.17	0.43	0.09	0.10	0.29	0.14	0.19	0.12	0.12

Area 12 Dip Stick Rain Gage Reading: 0.50 inches of precipitation from 11/02/2007 to 12/05/2007

Data Tabulated By: /s/ J Wood 12/07/2007

Data Quality Control: /s/ Raymond Dennis 12/07/2007

Certified By: /s/ Kip Smith 12/7/2007

NTS PRECIPITATION

December 2007

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1	0.25	0.12	0.04	0.07	0.03	0.30	0.11	0.12	0.06	0.12	0.01	0.13	0.08	0.01	0.04		0.11
2							0.01										
3																	
4																	
5																	
6	0.45	0.02			0.02	0.51		0.10	0.02	0.13	0.18	0.10	0.23	0.06	0.07	0.02	
7	0.30	0.73	0.21	0.06	0.66	0.38	0.45	0.33	0.13	0.72	0.68	0.08	0.22	0.31	0.90	0.56	0.44
8		0.01	0.75	0.18	0.04	0.02	0.03	0.04	0.16		0.01	0.15		0.13		0.28	0.22
9												0.10					
10	0.03					0.01											
11																	
12																	
13																	
14																	
15																	
16																	
17	0.02																
18	0.15	0.19	0.11	0.18	0.12	0.21	0.03	0.09	0.26	0.31	0.10	0.03	0.12	0.13	0.14	0.07	0.13
19	0.08		0.04			0.02		0.04		0.02		0.02					0.06
20	0.11	0.03	0.20	0.07	0.07	0.13	0.07	0.05	0.17	0.13	0.06	0.02	0.04	0.04	0.08	0.14	0.13
21																	
22																	
23												0.16					
24												0.03					
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	1.39	1.10	1.35	0.56	0.94	1.58	0.70	0.77	0.80	1.43	1.04	0.82	0.69	0.68	1.23	1.07	1.09

Area 12 Dip Stick Rain Gage Reading: 1.10 inches of precipitation from 12/05/2007 to 1/02/2008

Data Tabulated By: /s/ Raymond Dennis 01/04/2008

Data Quality Control: /s/ J Wood 01/04/08

Certified By: /s/ Kip Smith 1/7/2008

NTS PRECIPITATION

January 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4	0.67	0.32	0.62	0.05	0.28	0.66	0.16	0.44	0.42	1.28	0.71	0.07	0.23	0.36	0.66	0.21	0.09
5		0.05		0.26		0.14		0.03			0.06			0.02			0.13
6																	
7				T													
8																	
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15																	
16																	
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19																	
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21																	
22																	
23	0.36	0.03	0.15		0.09	0.16	0.02	0.19	0.06	0.14	0.13	0.04	0.12	0.17	0.17	0.05	
24	0.09	0.10	0.02	0.09	0.02	0.21	0.18	0.09	0.02	0.03	0.14	0.02	0.05	0.02	0.04	0.01	0.08
25	0.02	0.02	0.01			0.06	0.01	0.02	0.01	0.01	0.03			0.02	0.02		
26	0.25	0.16	0.30		0.37	0.28		0.02	0.24	0.65	0.07	0.13	0.32	0.18	0.25	0.23	
27	0.30	0.33	0.29	0.36	0.13	0.39	0.55	0.33	0.16	0.06	0.41		0.19	0.44	0.39	0.07	0.54
28			0.01			0.02				0.01	0.02						
29																	
30																	
31																	
TOTAL	1.69	1.01	1.40	0.76	0.89	1.92	0.92	1.12	0.91	2.18	1.57	0.26	0.91	1.21	1.53	0.57	0.84

Area 12 Dip Stick Rain Gage Reading: 1.50 inches of precipitation from 01/04/2008 to 02/01/2008

Data Tabulated By: /s/ Raymond Dennis 03/7/2008

Data Quality Control: /s/ J Wood 03/07/2008

Certified By: /s/ Kip Smith 3/7/2008

NTS PRECIPITATION

February 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3	0.31	0.18		0.06	0.03	0.32		0.03	0.08	0.06	0.23	0.20	0.03	0.07	0.18	0.02	0.04
4									0.01								
5																	
6																	
7																	
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10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19												0.02					
20	0.10	0.17	0.06	0.01	0.04	0.17	0.07	0.08	0.02	0.08	0.04	0.20	0.14	0.07	0.15		0.08
21	0.23	0.07				0.13		0.01		0.03	0.02	0.15	0.20		0.01		
22	0.55	0.42	0.07	0.02	0.09	0.58	0.22	0.40	0.03	0.45	0.51	0.52	0.59	0.07	0.24		0.16
23	0.30	0.12	0.08	T	0.10	0.20	0.10	0.16	0.09	0.18	0.12	0.02	0.16	0.05	0.21	0.06	0.07
24	0.13	0.01		0.05		0.32		0.09		0.03	0.15	0.02	0.21		0.09	0.04	0.03
25																	
26																	
27																	
28																	
29																	
TOTAL	1.62	0.97	0.21	0.14	0.26	1.72	0.39	0.77	0.23	0.83	1.07	1.13	1.33	0.26	0.88	0.12	0.38

Area 12 Dip Stick Rain Gage Reading: 1.40 inches of precipitation from 02/01/2008 to 02/29/2008

Data Tabulated By: /s/ Raymond Dennis 03/07/2008

Data Quality Control: /s/ J Wood 03/07/2008

Certified By: /s/ Kip Smith 3/7/2008

NTS PRECIPITATION

March 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
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20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29						0.02							0.07				
30	0.42	0.17				0.52		0.30		0.03	0.25	0.32	0.34		0.32		
31																	
TOTAL	0.42	0.17	0.00	0.00	0.00	0.54	0.00	0.30	0.00	0.03	0.25	0.32	0.41	0.00	0.32	0.00	0.00

Area 12 Dip Stick Rain Gage Reading: 0.30 inches of precipitation from 03/01/2008 to 04/04/2008

Data Tabulated By: /s/ Raymond Dennis 05/02/2008

Data Quality Control: /s/ J Wood 05/02/2008

Certified By: /s/ Kip Smith 5/2/2008

NTS PRECIPITATION

April 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
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11																	
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19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Area 12 Dip Stick Rain Gage Reading: 0.00 inches of precipitation from 04/04/2008 to 05/01/2008

Data Tabulated By: /s/ Raymond Dennis 05/02/2008

Data Quality Control: /s/ J Wood 05/02/2008

Certified By: /s/ Kip Smith 5/2/2008

NTS PRECIPITATION

May 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
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14																	
15																	
16																	
17																	
18																	
19																	
20	0.03					0.01											
21																	
22																	
23	0.02	0.02			0.01	0.16	0.01	0.02	0.02	0.02		0.02	0.04			0.02	0.04
24	0.03		0.01	0.01	0.03	0.10			0.04	0.05	0.08		0.03				0.01
25	0.24	0.02	0.19	0.07	0.13	0.15	0.05	0.30	0.17	0.18	0.35	0.16	0.24	0.05	0.36	0.06	0.07
26				T													
27																	
28												0.01					
29																	
30																	
31																	
TOTAL	0.32	0.04	0.20	0.08	0.17	0.42	0.06	0.32	0.23	0.25	0.43	0.19	0.31	0.05	0.36	0.08	0.12

Area 12 Dip Stick Rain Gage Reading: 0.50 inches of precipitation from 05/01/2008 to 05/30/2008

Data Tabulated By: /s/ J Wood 06/02/08

Data Quality Control: /s/ Raymond Dennis 06/05/08

Certified By: /s/ Kip Smith 6/5/2008

NTS PRECIPITATION

June 2008

	A12	BJY	CS	DRA	A06	E Tu	4JA	LF2	MER	MV	40 Mi	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4				T					0.01							0.01	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
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21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00

Area 12 Dip Stick Rain Gage Reading: 0.00 inches of precipitation from June 1 to July 6,2008.

Data Tabulated By: /s/ J Wood 07/07/2008

Data Quality Control: /s/ Raymond Dennis 07/07/2008

Certified By: /s/ Kip Smith 7/7/2008

APPENDIX F

SITE-SPECIFIC MONITORING DATA

*Monitoring data is summarized in Section 4.0 of this report, and the complete data set is kept in the project files in Mercury, NV.

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